alpha architect

Just Sit On Your Tail

Using Tail Hedging for Capital Reserves | CAOS ETF

Summary

- Because capital reserves primarily function as a hedge against income loss, allocating to tail-risk exposures may meaningfully improve outcomes during economic crashes that coincide with sharp spikes in unemployment.
- The Alpha Architect Tail Risk ETF (ticker: CAOS) may serve as an appropriate reserve asset as it seeks to be relatively a low volatility and positive returning source of crisis alpha.
- Investors must remain cognizant of the tradeoffs when choosing assets for reserves.

In April 2020, the U.S. reached its highest unemployment rate since the 1930s.[1] As the economic effects of a worldwide shutdown spread, unemployment rose to nearly 15%[2] while the market had experienced its worst drawdown since 2008[3]. The tragic nature of the health crisis was compounded by severe economic stress on American households as large swaths of the population were forced to quarantine. At the same time, personal savings rates skyrocketed to over 30%,[4] further reinforcing a vicious deflationary cycle in the economy.

As the cycle continued, one reality became clear to both investors and households: **robust financial plans must account for these tail risks.**

Historically, one popular answer is that households should set aside a portion of their earnings in capital reserves. Although recommended amounts vary from pundit to pundit, the most commonly cited guideline is to maintain emergency reserves equal to three to six months of expenses. Households with two incomes, employment in noncyclical sectors, low debt burdens, or low risk aversion may reasonably target three months of expenses; whereas households with a single income, employment in cyclical industries, higher debt burdens, or greater risk aversion should aim for closer to six months.

There is an ongoing debate about the appropriate allocation to reserves in an investor's financial plan. Some argue that liquidity buckets—such as a dedicated emergency fund—are behaviorally optimal, while others contend that reserves should be optimized at the total portfolio level. Personalities such as Dave Ramsey recommend holding three to six

[1] Source: Bureau of Labor Statistics. https://data.bls.gov/pdq/SurveyOutputServlet
[2] Source: Federal Reserve Bank of St. Louis. https://fred.stlouisfed.org/series/UNRATE
[3] Market drawdown using monthly return data from Kenneth R. French Data Library. Tuck School of Business at Dartmouth. Drawdown measures the largest single drop from peak to bottom in the value of a portfolio before a new peak is achieved.
[4] Source: Federal Reserve Bank of St. Louis. https://fred.stlouisfed.org/series/PSAVERT

months of expenses in liquid reserves, whereas others, like Ramit Sethi, suggest maintaining a full year.

These perspectives can be framed in various ways.

Regardless of one's approach to the questions of (1) how much liquid capital to hold and (2) how to behaviorally manage reserves, a fundamental question still remains:

What is the appropriate asset for capital reserves?

In the following piece, we make the case for why investors should consider positive-returning, tail-hedging exposures as a potential alternative to capital reserves. We begin by analyzing the role and characteristics of capital reserves in hedging income loss, then examine how the Alpha Architect Tail Risk ETF (ticker: CAOS) may seek to improve upon those characteristics, and conclude by discussing potential pitfalls investors should consider.

Let's begin.

Why Reserves are Important

It is important to first clarify that, in this context, "reserves" refers to capital waiting to be deployed into long-term allocations or as a hedge to income loss. Therefore, ideal capital reserves should be:

1) **Low volatility:** There should be little day-to-day variation in the pricing of this capital, providing confidence in nominal principal preservation when reserves must be accessed quickly.

2) **Positive returns:** Because inflation can erode purchasing power, ideal reserve assets should seek to provide long term positive returns.

3) **A source of crisis alpha:** Because reserves seek to hedge income loss, these should seek to provide returns during deflationary environments, which tend to coincide with periods of economic and financial stress when job loss is more likely to occur.

In theory, assets that satisfy all three criteria could be viewed as potential candidates for reserve assets. Moreover, if an asset meaningfully improves upon one of these dimensions without materially compromising the other two, it can reasonably be considered a suitable reserve asset.

Enter CAOS

In our view, the Alpha Architect Tail Risk ETF (ticker: CAOS) satisfies all three criteria and may serve as a more effective alternative for capital reserves.

CAOS seeks to deliver asymmetric returns during periods of market turmoil, defined as deep and rapid declines in the U.S. equity market, while targeting net positive returns over the long term. The strategy is implemented through a combination of out-of-the-money put options, which are intended to respond to sharp market drawdowns, and two risk-defined option structures: Box spreads, which are designed to generate returns independent of market direction, and short put spreads, which are intended to benefit during periods of positive equity market performance in normal market times. The resulting portfolio structure aims to produce relatively stable returns with the potential for meaningful gains during market crashes.

While we generally view CAOS as a bond complement,[5] CAOS could also be viewed as a potential candidate for capital reserves. Let's revisit the three defining characteristics of the ideal reserve asset and discuss what investors might reasonably expect from CAOS across each dimension.

[5] Head to funds.alphaarchitect.com/etfmodel to view how CAOS could potentially fit in an advisor's portfolio as a replacement for bond exposures.

Low Volatility	While CAOS has exhibited lower volatility than most risk-on assets, and, since March 3, 2023, has experienced volatility slightly below that of intermediate-term Treasury securities,[6] it may display more volatility compared to other alternatives.
Positive Returning	Both since inception and since conversion, CAOS has produced positive returns.
Crisis Alpha	CAOS seeks to deliver asymmetric returns during rapid and severe market drawdowns. Notably, the strategy generated meaningful gains during the COVID market crash in 2020, as well as more modest gains during the Japanese market sell-off on August 5, 2024 and the April 2025 tariff-driven drawdown.

Under this framework, investors seeking to offset declines in human capital during periods of market stress, which are often associated with widespread job instability, could reasonably consider allocating a portion or all of their reserves to CAOS.

The argument is straightforward: if the objective is to partially or fully hedge the risk of losing near-term flows associated with human capital, then allocating to assets that seek convex payoffs during periods of economic stress may be more effective, provided those assets also exhibit relatively low volatility and positive expected returns.

Given that the probability of job loss is, on average, higher during periods of rapid and severe market drawdowns, and that tail-risk strategies seek to benefit from such episodes, CAOS may serve as a suitable candidate within a capital reserve framework.[7]

Going back to our 2020 example, CAOS gained roughly 40% year to date at its peak during the COVID-related market drawdown[8], as unemployment rose to nearly 15% in April 2020, the highest level since the Great Depression.

Potential Pitfalls

For investors who maintain capital reserves in a separate account, allocating to CAOS could be a reasonable approach, provided the investor understands and accepts the risks inherent in the strategy, including:

1) Relatively small day-to-day, month-to-month, and even year-to-year fluctuations in market value.
2) Volatility drag associated with slow crashes. As an example, some tail-hedging products suffered meaningfully in 2022 as volatility increased while the market never experienced any significant fast drops.
3) Idiosyncratic risk, as investors could suffer income loss regardless of market behavior or the prevailing stage of the economic cycle.

[6] As of 3/31/2026, CAOS has displayed an annual volatility of 4.09% vs. 5.16% for Treasuries. Volatility measures the degree to which an investment's historical returns deviate from its mean. Intermediate-term Treasury securities represented by the average returns at NAV of the 50 biggest open-ended funds (ETFs and mutual funds) based on assets under management (AUM) in the Intermediate Government Bond category. Intermediate-government portfolios have at least 90% of their bond holdings in bonds backed by the US government or by government-linked agencies. This backing minimizes the credit risk of these portfolios, as the US government is unlikely to default on its debt. Category determined by YCharts. On March 3, 2023. CAOS was converted to an ETF from the mutual fund AVOLX. At the same time, CAOS shifted its strategy and discontinued the selling of single-legged puts, with the goal of delivering lower volatility exposures.

[7] See Appendix A.

[8] Investing involves risk, including the loss of principal. Past performance does not guarantee future results. The performance data quoted represents past performance and does not guarantee future results. Investment return and principal value of an investment will fluctuate so that an investor's shares, when sold or redeemed, may be worth more or less than their original cost. Current performance may be lower or higher than the performance quoted. For performance data current to the most recent month end, please call (215) 882-9983 or visit funds.alphaarchitect.com.

In response to each of these points, it's important to note that:

1) Job loss and unexpected expenses can be relatively infrequent events. As a result, small short-term fluctuations are unlikely to meaningfully impact investors.
2) While volatility drag is possible, unemployment *declined* over the course of 2022.[9] As a result, despite elevated market volatility, the average worker did not need to draw on emergency reserves. That said, it remains possible, though less likely, for both volatility and unemployment to rise without the market experiencing any meaningful drawdowns.
3) When using CAOS, investors seek to gain when job loss is most *probable*–not just *possible*. This distinction is particularly relevant for individuals employed in procyclical industries such as finance and technology.

For investors whose primary objective is price stability, other lower volatility offerings may remain the more appropriate asset for capital reserves.

Conclusion

Because emergency reserves primarily function as a hedge against income loss, allocating to tail-risk exposures may meaningfully improve outcomes during economic crashes that coincide with sharp spikes in unemployment.

CAOS may serve as an appropriate reserve asset, as it seeks to be relatively a low volatility and positive returning source of crisis alpha.

That said, investors must remain cognizant of the trade-offs involved in deploying capital reserves to CAOS, and at the same time, recognize the long-term drawbacks and opportunity costs associated with holding unused reserves. If you would like to know more about CAOS, and to see standardized returns, head to funds.alphaarchitect.com/caos.

[9] Source: Federal Reserve Bank of St. Louis. https://fred.stlouisfed.org/series/UNRATE

Appendix A

Lifecycles & Tails

While capital reserves serve as a type of short-term self-insurance against unforeseen expenses, temporary loss of income is generally the most salient risk sought to be hedged with these reserves. Framed differently, such capital buffers help mitigate downside volatility in human capital. As with most cashflowing assets, there is an appropriate discount rate, cash flow growth and timing assumptions tied to the valuation of said asset.

Consider the following discount cash flow model, where PV_0 represents the present value of an asset, CF the beginning cashflow, g the appropriate growth variable and df the discount factor.

$$PV_0 = CF + \frac{CF \times (1+g)}{(1+df)} + \frac{CF \times (1+g)^2}{(1+df)^2} + \ldots + \frac{CF \times (1+g)^n}{(1+df)^n}$$

As cash flows are discounted further into the future, they exert progressively less influence on an asset's present value. Stated differently, cash flows that are closer to the present are disproportionately more valuable. This intuition applies equally to human capital. When expected near-term income is disrupted due to job loss, the present value of human capital can decline materially. Emergency reserves function as a buffer, partially offsetting the loss of these near-dated cash flows.

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PRINCIPAL RISKS

Selling or Writing Options. Writing option contracts can result in losses that exceed the seller's initial investment and may lead to additional turnover and higher tax liability. The risk involved in writing a call option is that there could be an increase in the market value of the underlying or reference asset. An underlying or reference asset may be an index, equity security, or ETF. If this occurs, the call option could be exercised and the underlying asset would then be sold at a lower price than its current market value. In the case of cash settled call options such as SPX options, the call seller would be required to purchase the call option at a price that is higher than the original sales price for such call option. Similarly, while writing call options can reduce the risk of owning the underlying asset, such a strategy limits the opportunity to profit from an increase in the market value of the underlying asset in exchange for up-front cash at the time of selling the call option. The risk involved in writing a put option is that there could be a decrease in the market value of the underlying asset. If this occurs, the put option could be exercised and the underlying asset would then be sold at a higher price than its current market value. In the case of cash settled put options, the put seller would be required to purchase the put option at a price that is higher than the original sales price for such put option.

Buying or Purchasing Options Risk. If a call or put option is not sold when it has remaining value and if the market price of the underlying asset, in the case of a call option, remains less than or equal to the exercise price, or, in the case of a put option, remains equal to or greater than the exercise price, the buyer will lose its entire investment in the call or put option. Since many factors influence the value of an option, including the price of the underlying asset, the exercise price, the time to expiration, the interest rate, and the dividend rate of the underlying asset, the buyer's success in implementing an option buying strategy may depend on an ability to predict movements in the prices of individual assets, fluctuations in markets, and movements in interest rates. There is no assurance that a liquid market will exist when the buyer seeks to close out any option position. When an option is purchased to hedge against price movements in an underlying asset, the price of the option may move more or less than the price of the underlying asset.

Box Spread Risk. A Box Spread is a synthetic bond created by combining different options trades that have offsetting spreads (e.g., purchases and sales on the same underlying instrument, such as an index or an ETF, but with different strike prices). If one or more of these individual option positions are modified or closed separately prior to the option contract's expiration, then the Box Spread may no longer effectively eliminate risk tied to the underlying asset's price movement. Furthermore, the Box Spread's value is derived in the market and is in part, based on the time until the options comprising the Box Spread expire and the prevailing market interest rates. If the Fund (or an underlying ETF) sells a Box Spread prior to its expiration, then the Fund may incur a loss. The Fund's ability to profit from Box Spreads

is dependent on the availability and willingness of other market participants to sell Box Spreads to the Fund (or the underlying ETF) at competitive prices.

FLEX Options Risk. FLEX Options are exchange-traded options contracts with uniquely customizable terms like exercise price, style, and expiration date. Due to their customization and potentially unique terms, FLEX Options may be less liquid than other securities, such as standard exchange listed options. In less liquid markets for the FLEX Options, the Fund may have difficulty closing out certain FLEX Options positions at desired times and prices. The value of FLEX Options will be affected by, among others, changes in the underlying share or equity index price, changes in actual and implied interest rates, changes in the actual and implied volatility of the underlying shares or equity index and the remaining time to until the FLEX Options expire. The value of the FLEX Options will be determined based upon market quotations or using other recognized pricing methods. During periods of reduced market liquidity or in the absence of readily available market quotations for the holdings of the Fund, the ability of the Fund to value the FLEX Options becomes more difficult and the judgment of Arin Risk Advisors (employing the fair value procedures adopted by the Board of Trustees of the Trust) may play a greater role in the valuation of the Fund's holdings due to reduced availability of reliable objective pricing data.

Derivatives Risk. A derivative is any financial instrument whose value is based on, and determined by, another asset, rate or index (i.e., stock options, futures contracts, caps, floors, etc.). When the Fund obtains exposure to derivatives it will be exposed to the risks of those derivatives. The use of derivatives for non-hedging purposes may be considered to carry more risk than other types of investments. Unfavorable changes in the value of the underlying asset, rate or index may cause sudden losses. Changes in the value of a derivative may not correlate perfectly with the underlying asset, rate or index, a the Fund could lose more than the principal amount invested. Derivative instruments are subject to a number of risks including counterparty, liquidity, interest rate, market, credit and management risks, as well as the risk of improper valuation.

Counterparty Risk. Counterparty risk is the risk that a counterparty to a financial instrument held by the Fund may become insolvent or otherwise fail to perform its obligations, and the Fund may obtain no or limited recovery of its investment, and any recovery may be significantly delayed. Exchange listed options, including FLEX Options, are issued and guaranteed for settlement by the Options Clearing Corporation ("OCC"). The Fund's investments are at risk that the OCC will be unable or unwilling to perform its obligations under the option contract terms. In the unlikely event that the OCC becomes insolvent or is otherwise unable to meet its settlement obligations, the Fund could suffer significant losses.

Leverage Risk. Leverage risk refers to the potential for increased volatility and losses in a portfolio due to the use of derivatives or other financial instruments that may magnify gains and losses beyond the initial investment. The Fund will utilize derivatives, such as options, to gain exposure to certain assets or markets with a smaller initial investment. While leveraging derivatives can amplify gains, it can also magnify losses significantly. Leverage could possibly create increased volatility for the Fund. Cash and

Cash Equivalents Risk. At any time, the Fund may have significant investments in cash or cash equivalents. When a substantial portion of a portfolio is held in cash or cash equivalents, there is the risk that the value of the cash account, including interest, will not keep pace with inflation, thus reducing purchasing power over time.
Market Risk. The Fund's investments are subject to changes in general economic conditions, general market fluctuations and the risks inherent in investment in interest rate sensitive markets. Interest rate markets can be volatile and prices of investments can change substantially due to various factors including, but not limited to, economic growth or recession, the investment's average time to maturity, changes in interest rates, changes in the

actual or perceived creditworthiness of issuers, and general market liquidity. The Fund is subject to the risk that geopolitical events will disrupt securities markets and adversely affect global economies and markets. Local, regional or global events such as war, acts of terrorism, the spread of infectious illness or other public health issues, or other events could have a significant impact on the Fund and its investments.

Equity Securities Risk. Investments in securities whose performance is linked to that of equity securities, such as SPX Options, may fluctuate in value in response to many factors, including the activities of the individual issuers included in the Index, general market and economic conditions, interest rates, and specific industry changes. Such price fluctuations subject the Fund to potential losses. Investment Risk. When you sell your Shares of the Fund, they could be worth less than what you paid for them. Therefore, you may lose money by investing in the Fund.

Large-Capitalization Companies Risk. Large-capitalization companies may trail the returns of the overall stock market. Large-capitalization stocks tend to go through cycles of doing better - or worse - than the stock market in general. These periods have, in the past, lasted for as long as several years. Larger, more established companies may be slow to respond to challenges and may grow more slowly than smaller companies.

Investment Company Risk. An investment in other registered investment companies (including other ETFs, affiliated and non-affiliated) is subject to the risks associated with those investment companies, which include, but are not limited to, the risk that such fund's investment strategy may not produce the intended results; the risk that securities in such fund may underperform in comparison to the general securities markets or other asset classes; and the risk that the fund will be concentrated in a particular issuer, market, industry or sector, and therefore will be especially susceptible to loss due to adverse occurrences affecting that issuer, market, industry or sector. Moreover, the Fund will incur duplicative expenses from such investments, bearing its share of that fund's expenses while also paying its own advisory fees and trading costs. Investments in ETFs are also subject to the "ETF Risks" described below.

In addition, the Fund may invest in underlying funds which invest a larger portion of their assets in one or more sectors than many other funds, and thus will be more susceptible to negative events affecting those sectors.

The Fund may invest in affiliated ETFs managed by the Adviser, Alpha Architect, and/or Arin Risk Advisors, including the Architect 1-3 Month Box ETF. The Adviser, Alpha Architect, and/or Arin may be subject to potential conflicts of interest in selecting underlying funds because the fees paid to it by certain affiliated underlying funds are higher than the fees paid by other affiliated and unaffiliated underlying funds. To the extent the Fund invests a significant percentage of its assets in any one affiliated ETF or across multiple affiliated ETFs, the Fund will be subject to a greater degree to the risks particular to the investment strategies employed by the Adviser, Alpha Architect, and/or Arin Risk Advisors.

Valuation Risk. Some portfolio holdings, potentially a large portion of the Fund's investment portfolio, may be valued on the basis of factors other than market quotations. This may occur more often in times of market turmoil or reduced liquidity. There are multiple methods that can be used to value a portfolio holding when market quotations are not readily available. The value established for any portfolio holding at a point in time might differ from what would be produced using a different methodology or if it had been priced using market quotations. Portfolio holdings that are valued using techniques other than market quotations, including "fair valued" securities, may be subject to greater fluctuation in their valuations from one day to the next than if market quotations were used. In addition, there is no assurance that the Fund could sell or close out a portfolio position for the value established for it at any time, and it is possible that the Fund would incur a loss because a portfolio position is sold or closed out at a discount to the valuation established by the Fund at that time.

High Portfolio Turnover Risk. The Fund's investment strategy is expected to result in a high portfolio turnover rate (100% or more). This will increase the Fund's brokerage commission costs, which could negatively impact the performance of the Fund. When taking into account derivative instruments, including option contracts, and instruments with maturities of one year or less at the time acquisition, the Fund's strategy will result in frequent portfolio trading and, if these instruments were included in the calculation of the Fund's portfolio turnover rate it would exceed 100%.

U.S. Government Securities Risk. U.S. government securities risk refers to the risk that debt securities issued or guaranteed by certain U.S. Government agencies, instrumentalities, and sponsored enterprises are not supported by the full faith and credit of the U.S. Government, and so investments in their securities or obligations issued by them involve credit risk greater than investments in other types of U.S. Government securities.

Management Risk. The Fund is actively managed and Arin Risk Advisors' ability to choose suitable investments and implement the strategies described above has a significant impact on the ability of the Fund to achieve its investment objectives. In addition, there is the risk that the investment process, techniques and analyses used by Arin Risk Advisors will not produce the desired investment results and the Fund may lose value as a result.

Authorized Participants, Market Makers and Liquidity Providers Concentration Risk. The Fund has a limited number of financial institutions that may act as Authorized Participants ("APs"). In addition, there may be a limited number of market makers and/or liquidity providers in the marketplace. To the extent either of the following events occur, Shares may trade at a material discount to NAV and possibly face delisting: (i) APs exit the business or otherwise become unable to process creation and/or redemption orders and no other APs step forward to perform these services, or (ii) market makers and/or liquidity providers exit the business or significantly reduce their business activities and no other entities step forward to perform their functions.

Premium-Discount Risk. The Shares may trade above or below their net asset value ("NAV"). The market prices of Shares will generally fluctuate in accordance with changes in NAV as well as the relative supply of, and demand for, Shares on Cboe BZX Exchange, Inc. (the "Exchange") or other securities exchanges. The trading price of Shares may deviate significantly from NAV during periods of market volatility or limited trading activity in Shares. In addition, you may incur the cost of the "spread," that is, any difference between the bid price and the ask price of the Shares.

Cost of Trading Risk. Investors buying or selling Shares in the secondary market will pay brokerage commissions or other charges imposed by brokers as determined by that broker. Brokerage commissions are often a fixed amount and may be a significant proportional cost for investors seeking to buy or sell relatively small amounts of Shares.

Trading Risk. Although the Shares are listed on the Exchange, there can be no assurance that an active or liquid trading market for them will develop or be maintained. In addition, trading in Shares on the Exchange may be halted. In stressed market conditions, the liquidity of Shares may begin to mirror the liquidity of its underlying portfolio holdings, which can be less liquid than Shares, potentially causing the market price of Shares to deviate from its NAV. The spread varies over time for Shares of the Fund based on the Fund's trading volume and market liquidity and is generally lower if the Fund has high trading volume and market liquidity, and higher if the Fund has little trading volume and market liquidity (which is often the case for funds that are newly launched or small in size).

Cash Creation Unit Risk. Unlike most other ETFs, the Fund expects to effect a substantial portion of its creations and redemptions for cash, rather than in-kind securities (although redemptions will also be done in-kind under certain circumstances). The use of cash creations and redemptions may also cause the Fund's shares to trade in the market

at greater bid-ask spreads or greater premiums or discounts to the Fund's NAV. As a practical matter, only institutions and large investors, such as market makers or other large broker dealers, also known as "authorized participants," create or redeem shares directly through the Fund. Most investors will buy and sell shares of the Fund on an exchange through a broker-dealer. Cash creation and redemption transactions may result in certain brokerage, tax, execution, price movement and other costs and expenses related to the execution of trades resulting from such transactions. To offset these expenses, the Fund will collect fees from the applicable authorized participant to reimburse the Fund for any costs incurred by the Fund that result from a cash creation or redemption. The use of cash for redemptions will limit the tax efficiency of the Fund.

Tax Risk. The Fund intends to qualify as a regulated investment company ("RIC") under the Internal Revenue Code of 1986, as amended. However, the U.S. federal income tax treatment of certain aspects of the options strategy employed by the Fund are not entirely clear under existing law, including identifying the issuer of an option, and could affect such qualification. If, in any year, the Fund fails to qualify as a RIC, the Fund itself generally would be subject to U.S. federal income taxation and distributions received by its shareholders generally would be subject to further U.S. federal income taxation.

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