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PROTECTING PORTFOLIOS DURING PERIODS OF EQUITY DRAWDOWN: ASSESSING THE ALTERNATIVES

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Summary

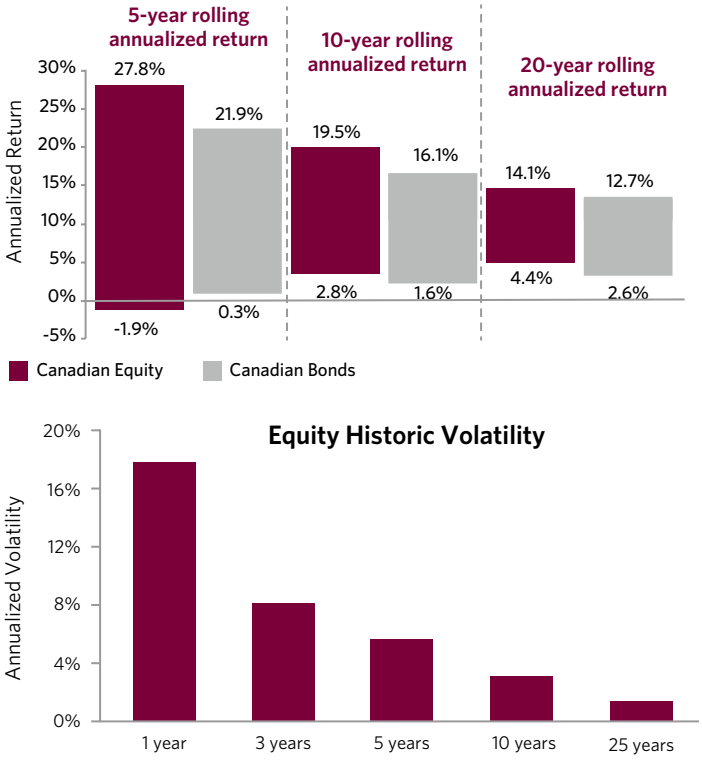
- Equities represent the cornerstone of many investment portfolios. Long-term returns have been attractive, generating significant capital appreciation.
- But equities exhibit two unattractive characteristics. First, an excessive exposure to macroeconomic growth risk. Second, periodic deep losses. This excess skew incentivizes investors to seek out asset classes and investment strategies that offer attractive conditional correlations.
- Potential candidates include diversifying multi-asset absolute return strategies, safe haven assets such as Gold and U.S. Treasuries, and derivative-based hedging strategies.
- To maximize the probability of achieving long-term performance targets, investors have to solve for excess equity skew while continuing to deploy as much risk as they can tolerate. We offer some solutions to this challenge.

Introduction

Public equities are the cornerstone of most investor portfolios. They owe this position to a combination of attractive historical returns and relatively low long-term risk (Figure 1). They also generally exhibit high liquidity.

We expect public equities to retain this dominant position for the foreseeable future. Annual absolute returns to equities over the next ten years are expected to be more modest compared with historical annual averages, reflecting relatively high valuations in a number of markets. But against Developed Market (DM) sovereign bonds, expected equity returns remain relatively attractive.

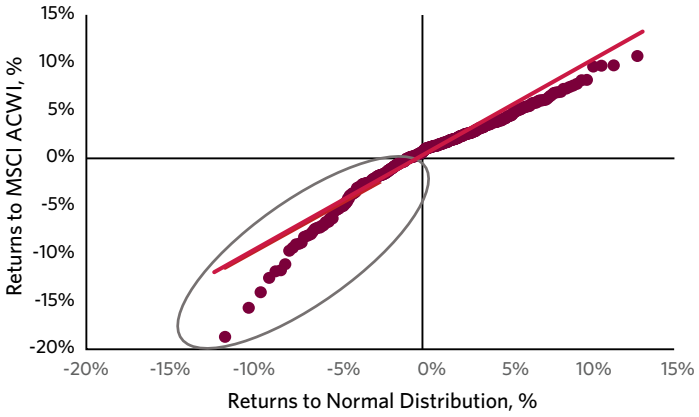
Figure 1 – Equities exhibit attractive long-term returns and low risk



Source: CIBC Asset Management Inc., Bloomberg 1950-2020. Canadian Equities and Canadian Bonds represented by S&P TSX Composite Index and FTSE TMX Bond Universe, respectively. Volatility measured as annualized standard deviation.

Public equities do have two relatively unattractive features that investors often seek to mitigate. First, they encumber investors with a concentrated exposure to macroeconomic growth risk. We have discussed this feature often (for instance, see Alternatives: How much to allocate). It is not a problem that hinders performance most of the time; in fact, quite the opposite. But portfolio concentrations of any type do have negative consequences sooner or later, and this one gives rise to the second unattractive feature of public equities: periodic deep capital drawdowns, also known as excess return skewness (relative to a Normal distribution; Figure 2).

Figure 2 – Equity returns versus a Normal distribution



The information was prepared by CIBC Asset Management Inc. using the following third-party service providers' data: Bloomberg Finance L.P.. Chart report returns to public equities (MSCI ACWI) relative to a Normal distribution. Sample: January 1988-April 2021.

In this paper, we examine ways to counter excess equity skew (or tail risk), by identifying asset classes and strategies that reliably demonstrate what is termed *convexity* relative to equities. It is not enough to allocate to asset classes and strategies that are expected to add value on average. They have to be right at the right times. This is a tall order.

The most common way investors seek to mitigate equity tail risk is by tactically adjusting the size of strategic equity allocations and, implicitly, timing market participation. We do not recommend this approach. For long-term investors, it has paid to remain invested at strategic equity targets. To do otherwise has often led to inferior returns; a substantial proportion of annual equity returns have historically been generated in just a few days each year. Miss these, and portfolio performance can look markedly inferior (Figure 3).

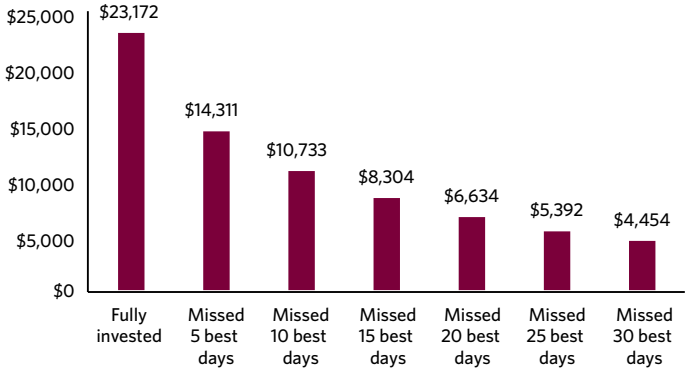
So how to address the challenge of maximizing the probability of achieving target long-term capital accumulation while minimizing the short-term impact of equity excess skew?

Best to work backwards. Instead of determining a strategic allocation to equities and then figuring out the associated expect portfolio return, it pays to begin with investor risk tolerance and return targets. From there, we can construct an optimal portfolio that combines a core allocation to equities with asset classes and strategies included to alleviate the impact of periodic significant equity drawdowns.

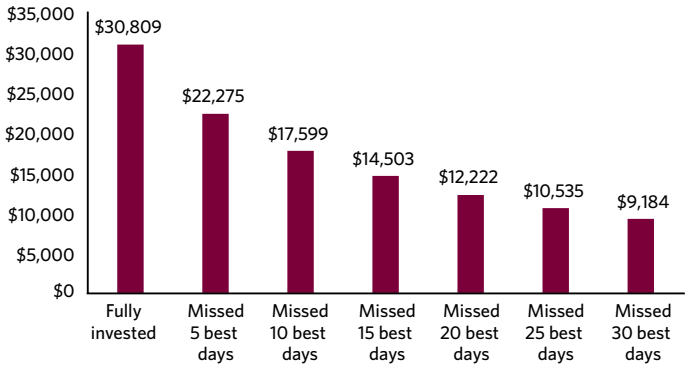
In this spirit, some large U.S. public pension plans explicitly create tail risk mitigation sub-portfolios within their overall plan portfolio, to complement core—public and private—equity allocations (Meketa, 2019). Importantly, these investors maintain focus on required long-term portfolio returns. If managed well, risk mitigation does not have to incur a significant expected opportunity cost.

Figure 3 – Tactically timing participation in the equity market has often led to inferior returns

a) S&P/TSX 60



b) MSCI ACWI Index (CAD)



The information was prepared by CIBC Asset Management Inc. using the following third-party service providers' data: Bloomberg LLC. Charts reports returns to the S&P 500, the S&P/TSX, and MSCI ACWI (CAD) over the period January 2000 – December 2020, assuming an investor was either fully invested throughout the sample or was uninvested for x days each year. Assumes an initial investment of $10,000.

Ways to mitigate the impact of equity drawdowns

The descriptor 'risk mitigation' encompasses several approaches to ameliorate the unattractive skew of equity returns. Each one presents tradeoffs between benefit, cost, and reliability. We can gather the more compelling candidates into three broad sleeves: Diversification; Opportunistic Hedging; and Structured Notes. In this paper, we focus on the first two sleeves, and encourage readers interested in learning about the third sleeve to read our Adding Structured Products whitepaper and to access the resources available here.

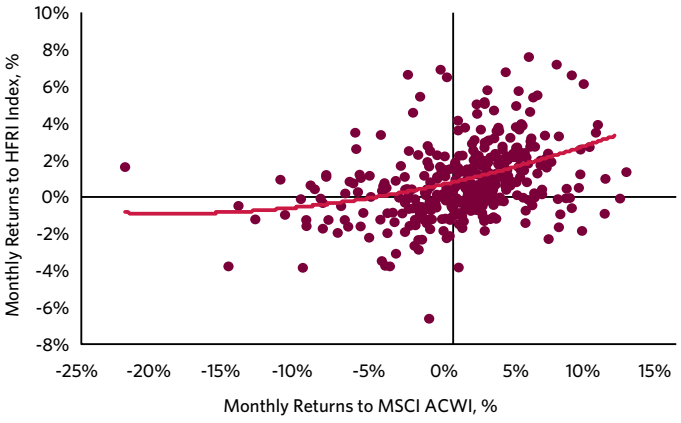
Diversification

This sleeve seeks to mitigate periodic significant capital losses to public equities by embracing as much investment breadth as possible, across and within asset classes, strategies, geographies, and time. Achieving an attractive conditional correlation to a portfolio's core equity allocation—positive when equities outperform, and negative during periods of significant equity underperformance—represents the stretch target of solutions in this sleeve. Candidates include top-down macro investment strategies and Safe Haven assets.

1. Macro strategies

Researchers often represent macro strategies using a generic index, such as the HFRIMI Macro Hedge Fund index. The index demonstrates attractive relative convexity to equities, over a long sample period (Figure 4). But it is not investible.

Figure 4 – Generic macro strategies exhibit relative convexity to equities



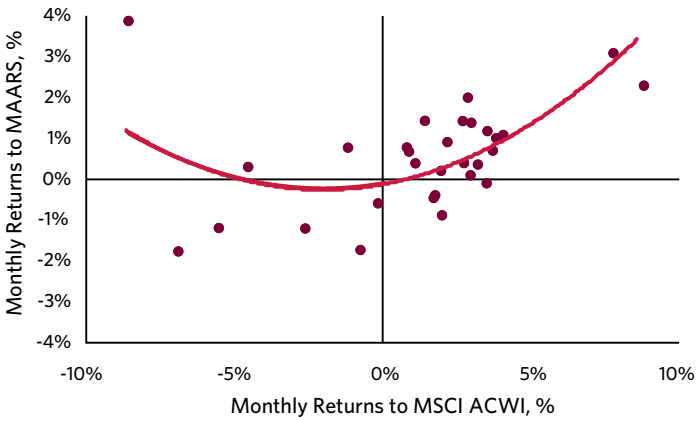
The information was prepared by CIBC Asset Management Inc. using the following third-party service providers' data: Bloomberg Finance L.P.. Sample: January 1988-April 2021.

If we make investibility a key selection criterion, then an obvious candidate to represent the Macro category is the CIBC Multi-Asset Absolute Return Strategy (MAARS). This is a broad macro solution that integrates quantitative strategies and rigorous forward-looking qualitative judgment, and exploits a wide range of asset classes, geographies, and investment horizons to generate returns. It is analogous to a new generation Balanced portfolio, encompassing a great deal more investment breadth than a traditional 60/40 portfolio, a focus on absolute returns, and a disciplined risk-aware approach to strategic tilting between identified investment opportunities as an additional layer of performance maximization.[2]

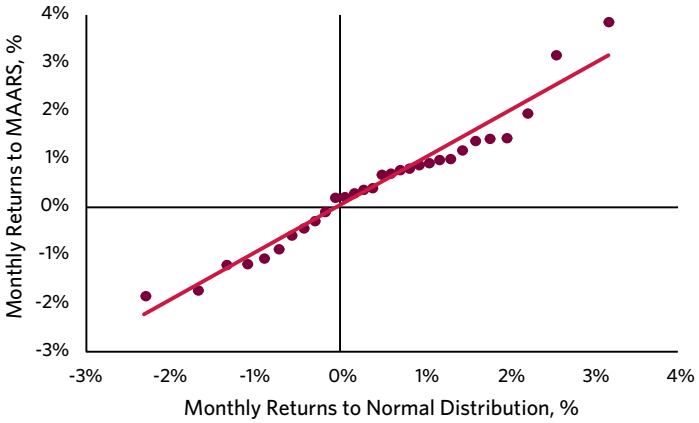
Since the inception of MAARS, equities have experienced two significant drawdowns, in 2018 Q4 and 2020 Q1. MAARS performed well during both. It has demonstrated an ability to deliver the relative convexity to equities that investors prize (Figure 5, chart a), while showing no evidence of excess skew (Figure 5, chart b).

Figure 5 - MAARS has proven adept at mitigating periods of significant equity market drawdowns

a) MAARS vs. MSCI ACWI



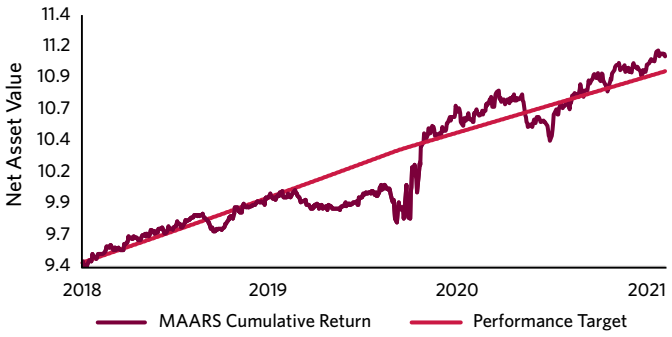
b) MAARS vs. Normal distribution



The information was prepared by CIBC Asset Management Inc. using the following third-party service providers' data: Bloomberg Finance L.P.. Sample: November 2018-April 2021.

MAARS has also achieved performance consistent with its long-term return target (an annual average 5% plus cash[3]; Figure 6). Importantly, this target is comparable to the annual return we expect to see for core equity allocations over the next 10 years. This means investors can allocate to MAARS from existing equity exposure without incurring an expected return opportunity cost (Figure 7).

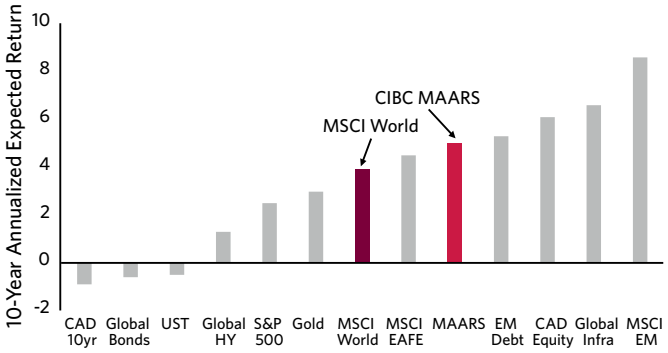
Figure 6 - CIBC MAARS performance is consistent with its cumulative return target[4]



The information was prepared by CIBC Asset Management Inc. using the following third-party service providers' data: Bloomberg Finance L.P.. Sample: October 2018-April 2021.

Putting all these facets together, MAARS appears to be a strong candidate for inclusion in a Tail Mitigation portfolio sleeve.

Figure 7 – The annual MAARS return target compares favorably with annualized expected return to equities

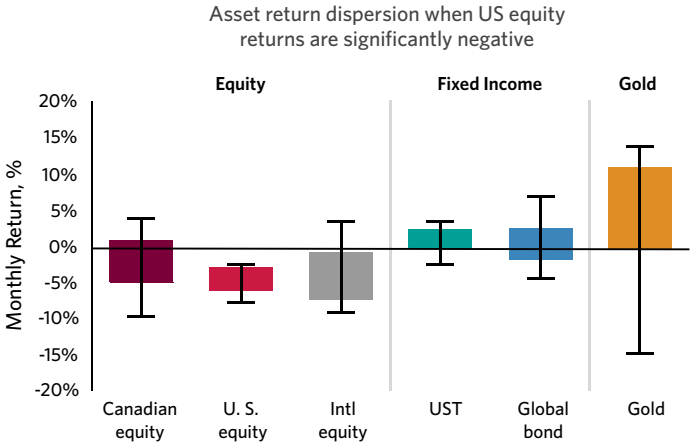


As at February 2021. The information was prepared by CIBC Asset Management Inc. using the following third-party service providers' data: Bloomberg Finance L.L.P., JP Morgan Asset Management. UST = 10-year U.S. Treasuries. HY = High Yield. Infra = Infrastructure. EM = Emerging Markets. Expected return net of cash.

2. Safe Haven assets

Allocations away from equity and into Safe Haven assets is a default Tail Mitigation strategy of many investors. Representative Safe Havens include Gold and Developed Market (DM) sovereign fixed income. Both asset classes have often demonstrated an ability to alleviate the effect of significant equity drawdowns (Figure 8). We expect Gold to retain this ability, on average, and discuss its broader portfolio role in depth in our paper Where Gold Fits in Portfolios.

Figure 8 – Gold and DM sovereign fixed income have often proven adept at mitigating periods of significant equity market drawdowns



The information was prepared by CIBC Asset Management Inc. using the following third-party service providers' data: Bloomberg. Data Sample: January 1990 to February 2021. Monthly Data. UST = 10-year U.S. Treasuries.

DM sovereign bonds face a greater challenge, due to the continued low level of yields. Equally challenging, DM sovereign bonds have little expected annual return over the next ten years, relative to cash. This presents a major opportunity cost to long-term investors looking to counterbalance episodic significant equity capital losses.

This cost will encourage investors to consider substituting part of their DM sovereign fixed income exposure for other Safe Haven assets. Infrastructure Debt may be one candidate. This asset class offers a higher expected return, better inflation hedging properties, and similar liability matching features to DM sovereign fixed income. Growing policy focus on Green Energy in Europe and China, and a renewed focus in the U.S., suggests rising interest in Infrastructure as an asset class.

Opportunitistic Hedging

MAARS, other macro strategies, and Safe Haven assets seek to deliver relative convexity to equity returns through diversification. Strategies in the Opportunistic Hedging sleeve aim to achieve this outcome by directly profiting from the excess skew exhibited by equities. They include Momentum, its close relative Time-Series Trend, and derivative hedging strategies.

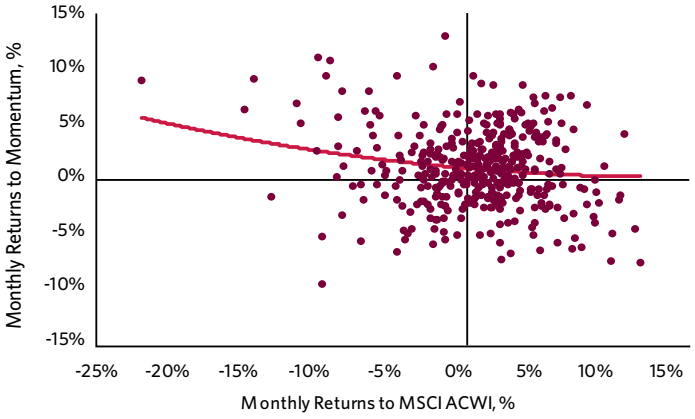
1. Momentum

Momentum strategies exploit periodic significant equity drawdowns by shorting assets with relatively negative trailing returns, and concurrently going long another set of assets with relatively positive trailing returns, on the assumption that return, and price, trends are persistent.

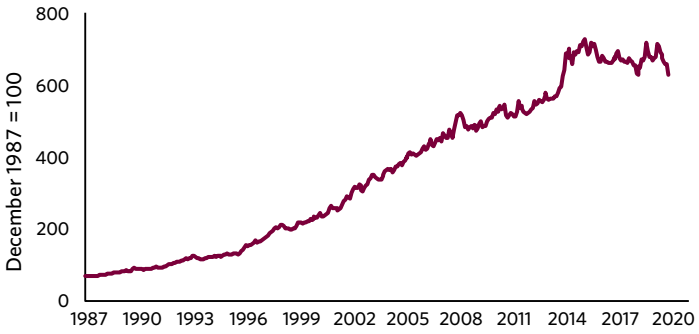
Overall, this strategy has proven its worth, with attractive relative convexity and long-term returns (Figure 9).

Figure 9

a) Correlation of returns to Momentum and MSCI ACWI



b) Momentum strategy cumulative return



The information was prepared by CIBC Asset Management Inc. using the following third-party service providers' data: Bloomberg Finance L.L.P., AQR. Strategy constructed using 12-month trailing returns and a 1-month holding period across 58 futures and forward contracts spanning equities, currencies, Fixed Income, and commodities. Sample is January 1987 – November 2020. Data accessed as at January 1st, 2021.

That said, and as highlighted by Figure 9b, the recent performance of Momentum strategies bears monitoring; including our illustrative example, traditional Momentum strategies have struggled to generate returns in the past decade. Whether the timing of this underperformance is coincident to, or caused by, the rising amount of assets invested in these strategies is moot.

Also important to consider with Momentum strategies is investment breath. The ability to mitigate periodic significant equity drawdowns has been demonstrated most adeptly by Momentum strategies that encompass a broad range of assets. For Momentum strategies constructed just on trailing equity returns alone, relative convexity appears more elusive (Figure 10).

Figure 10 – Investment breadth is an important component of Momentum's ability to mitigate periods of significant equity losses

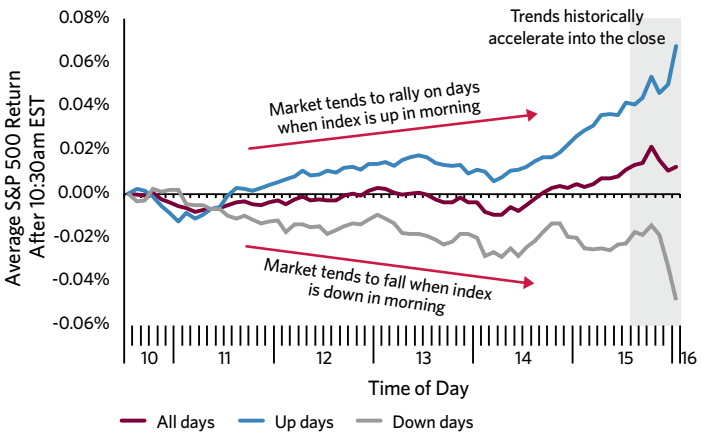
Date	MSCI ACWI	Momentum Equity	Momentum All assets
Aug-88	-5.82%	4.97%	1.40%
Oct-97	-6.21%	-14.43%	-0.38%
Aug-98	-15.11%	-17.33%	6.31%
Jan-00	-5.61%	-11.75%	0.35%
Sep-01	-9.59%	24.23%	9.37%
Jul-02	-8.76%	18.52%	5.66%
Jan-08	-8.53%	-16.40%	-3.26%
Sep-08	-13.30%	20.20%	-1.48%
May-10	-9.86%	-15.50%	-5.15%
Aug-11	-7.53%	-12.05%	2.63%
Aug-15	-7.05%	-18.19%	-1.77%
Oct-18	-7.77%	-10.73%	-0.53%
Feb-20	-8.39%	-26.80%	1.23%
Mar-20	-14.43%	-26.53%	9.08%
Median	-8.46%	-13.24%	0.79%

The information was prepared by CIBC Asset Management Inc. using the following third-party service providers' data: Bloomberg Finance L.L.P., AQR. Months selected are illustrative of periods of significant equity drawdowns. Data accessed as at January 1st, 2021.

2. Equity futures

We can also address risk mitigation using more sophisticated Momentum strategies, also implemented with futures contracts. One candidate strategy—inspired by Gao et. al. (2018), Baltussen et. al. (2020), Deutsche Bank (2019), & Goldman Sachs (2020)—begins from the observation that S&P 500 price trends established in the morning of each trading session often persist throughout the day (Figure 11).[5] On a normal day, these trends involve either small ups or downs. Nothing out of the ordinary, and so are ignored by our risk mitigation strategy. Periodically, they involve sharp declines. These we want to capture.

Figure 11 – S&P 500 price trends established in early morning often persist through the afternoon



The information was prepared by CIBC Asset Management Inc. using the following third-party service providers' data: Bloomberg LLC., Goldman Sachs. Data based on sign of return from prior close to 10:00 EST. Intraday tick data. Sample: August 2003 – June 2020.

Our proposed strategy initiates short futures positions that hedge an investor's strategic long equity exposure whenever the S&P 500 records a negative intra-day return greater than half a standard deviation below its 1-month trailing average. To maximize the probability of success—and minimize the risk of encountering intra-day price reversals—short hedging positions are initiated at three pre-determined times during the afternoon trading session. All shorts are covered at the end of the day, regardless of profit.

Advantages of this protection strategy include a low carry cost—futures are cheaper than options—and that hedging gains and losses are always realized on the same day; this suggests an ability to minimize the extent of profit decay experienced by the strategy.

It would be easy to dismiss this strategy as a short-term tactical trading model; after all, it is always in and out of the market within a single day. The reality is something different: when equity market drawdowns begin, they persist for many days until the bottom is reached. The 2020 Covid-19 drawdown was unusually violent, but the S&P 500 still took 23 days to bottom. It took 354 days in the 2007-2009 Great Financial Crisis. And 663 days in the 1929 crash. Not all the days in these periods saw negative returns, but the strategy can handle that. It is also very responsive. Rigorous strategy risk management allied to an ability to benefit from market losses has been rewarded (Figure 12).

Figure 12 – A combination of derivative momentum strategies & rigorous risk management can help insulate portfolios from significant equity drawdowns

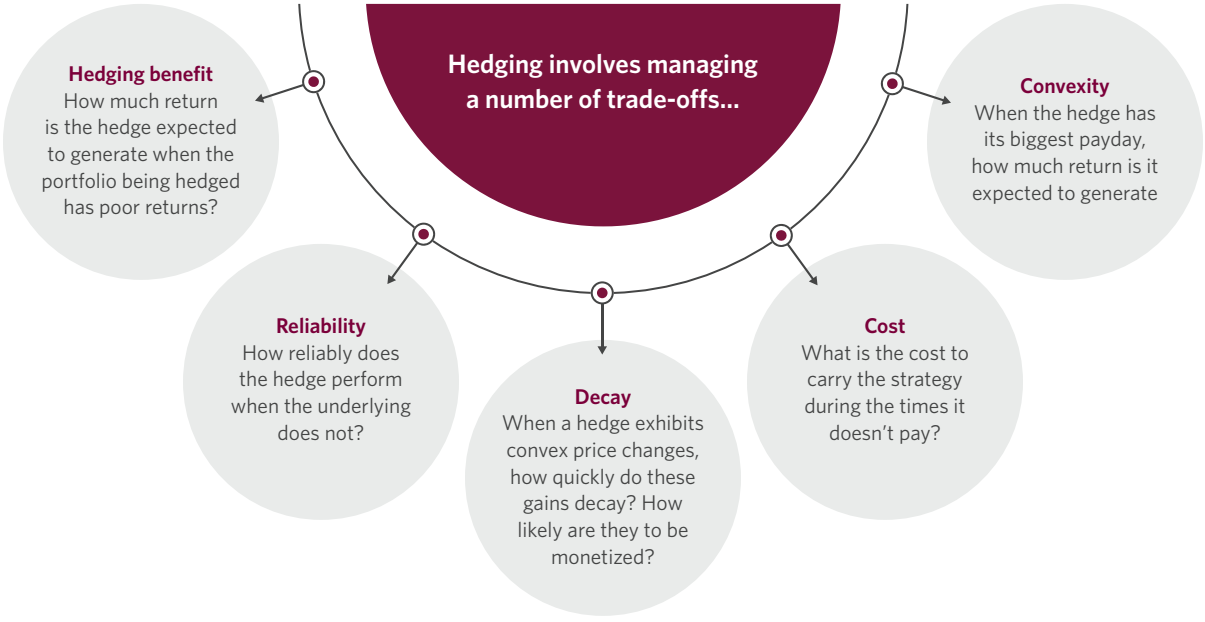


The information was prepared by CIBC Asset Management Inc. using the following third-party service providers' data: Bloomberg LLC. Illustrative backtested performance. Gross of fees and costs. Sample: January 2007-April 2021.

3. Option strategies

Another set of strategies in the Opportunistic Hedging sleeve seeks to mitigate periods of significant equity weakness by implementing derivative positions that overlay underlying strategic equity allocations. These strategies encompass a number of tradeoffs and challenges, including the need to minimize cost—defined in terms of both commitment of portfolio capital, which is typically low, and carry, which can be high—and to maximize both the reliability of the hedge and the extent of mark-to-market gains that can actually be monetized (Figure 13).

Figure 13 – Opportunistic derivative hedging strategies encompass a number of tradeoffs



The information was prepared by CIBC Asset Management Inc. using the following third-party service providers' data: Bank of America Merrill Lynch.

These tradeoffs underscore the importance of rigorous strategy management during both normal markets conditions and tail events.

a) Put option strategies

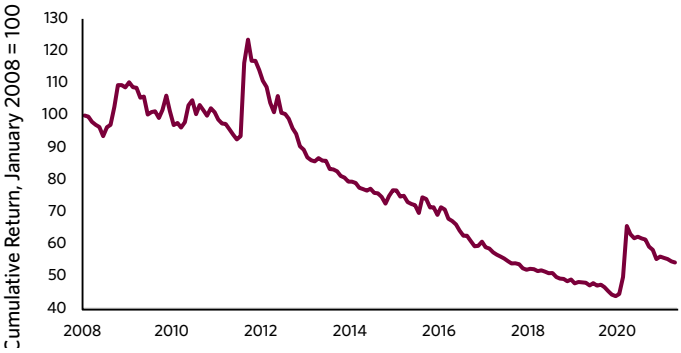
The classic option mitigation strategy involves the purchase of puts intended to act akin to insurance.

Long option strategies can be beneficial components of a portfolio due to their defined risk, leverage, and non-linear characteristics. Said differently, you can generate a whole lot of return with relatively little capital investment, as long as you are right. That's an important caveat. The profitability of a put strategy is dependent on the option buyer being right on three different outcomes at option expiry:

- equities do decline;
- the size of the decline, which has to be sufficiently large to make your option valuable;
- the timing of the decline, which has to coincide with the expiration of your option.

As significant equity drawdowns are infrequent, purchased options typically expire without value, and associated premiums represent a high cost of carry that cause a significant drag on strategy performance (Figure 14).

Figure 14 – Generic option strategies have proven to be an expensive source of insurance



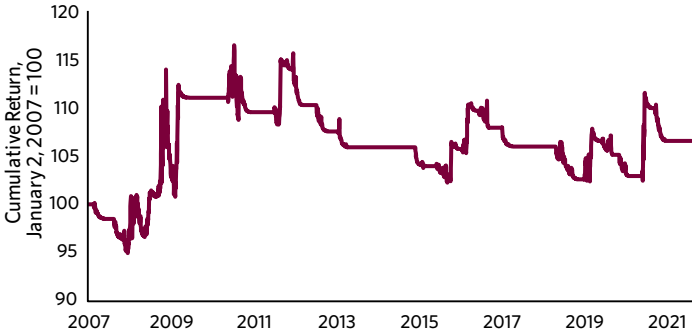
The information was prepared by CIBC Asset Management Inc. using the following third-party service providers' data: Bloomberg LLC. Reported cumulative returns are from the CBOE Eurekahedge Tail Risk Index. It is an equally weighted index of 7 constituent funds. The index is designed to provide a broad measure of the performance of underlying hedge fund managers that specifically seek to achieve capital appreciation during periods of extreme market stress. Sample: January 2008 – April 2021.

Realized investor experience may be even worse than shown in Figure 14; the episodic nature of equity drawdowns incentivizes investors to adopt these strategies immediately after a drawdown but then to relent before the next one occurs, as recency bias reasserts itself (AQR, 2020; Institutional Investor, 2020).

b) Conditional put option strategies

One solution to the high carry cost and time dependent nature of a naïve option strategy is conditional put protection. This combines the most attractive aspects of various hedging strategies. For instance, decisions to purchase put options can be conditioned on Momentum, as well as implied equity volatility. Pre-defined take-profit exit triggers can also be incorporated. The strategy continues to provide insurance during equity drawdowns. But carry cost in more benign market periods is minimized, and cumulative strategy performance is more attractive as a result (Figure 15).[5]

Figure 15 – Combining different aspects of tail mitigation in conditional put strategies can maintain protection and minimize carry costs

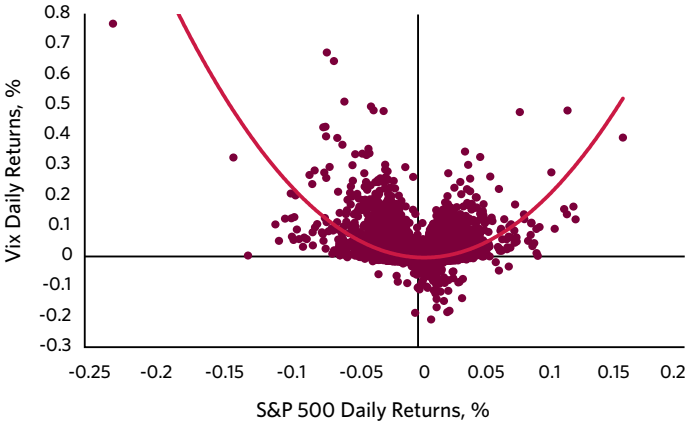


The information was prepared by CIBC Asset Management Inc. using the following third-party service providers' data: Bloomberg LLC. Illustrative backtested performance. Gross of fees and net of costs. Sample: January 2007-April 2021.

c) Options on equity volatility

Another candidate option strategy exploits the convex relationship between equity drawdowns and implied equity volatility. When equity prices fall, implied volatility—as measured by the Vix Index—tends to experience an outsized increase (Figure 16). Its historical beta to significant S&P 500 drawdowns exceeds one.

Figure 16 – Implied equity volatility exhibits an equity beta greater than unity, including during equity drawdowns

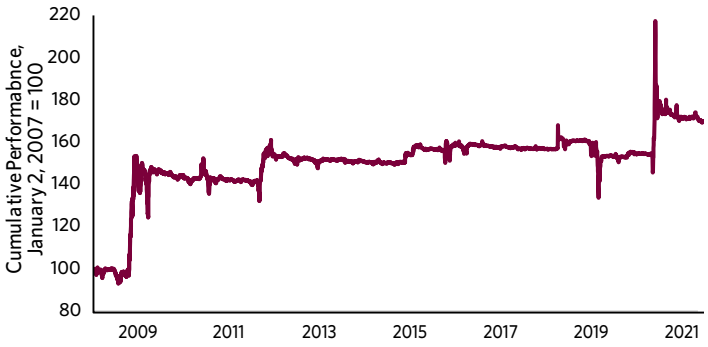


The information was prepared by CIBC Asset Management Inc. using the following third-party service providers' data: Bloomberg LLC., Barclays. Daily data. Sample: January, 1, 1927 – April 30, 2021.

We can exploit this relationship to implement a risk mitigation strategy. The first step is to buy call options on a 3-month Vix futures contract. Absent an accurate volatility forecasting model that facilitates implementation dexterity, we again have to confront the high carry cost associated with a persistent long option exposure; most of the time, these call options will expire worthless and the premium will be foregone by the buyer.

One way to minimize carry cost is to concurrently sell short S&P 500 put spreads.[6] If no equity drawdown and attendant volatility spike occurs prior to expiry, the premium earned from the short put spread position will approximately offset the negative carry of the long Vix call position, meaning that the strategy broadly breaks even. It adds value if gains to the long volatility call position during an equity drawdown outweigh losses on the short put spread, and if the volatility spike occurs concurrent to the equity drawdown. Historically, these conditions have been satisfied (Figure 17).

Figure 17 – Option strategies that exploit the relationship between equity returns & volatility can mitigate tail risk



The information was prepared by CIBC Asset Management Inc. using the following third-party service providers' data: Bloomberg LLC. Illustrative backtested performance. Gross of fees and costs. Sample: January 2008-April 2021.

Structuring portfolio tail mitigation solutions

Investment breadth and rigorous risk management are key to building a well-constructed portfolio that delivers on long-term performance targets. Breadth requires investors to include a broad range of rewarded risks into portfolios, rather than relying on just a concentrated few. This requirement extends to tail mitigation, too. The source of equity market drawdowns, and the speed of subsequent recoveries, are all different—for instance, a global pandemic in 2020, a sub-prime mortgage crisis in 2007, and a dot-com bubble in 2000—such that a one-size fits all approach to risk mitigation is ill-advised (Figure 18).

Figure 18 – The contours of equity market drawdowns are rarely consistent

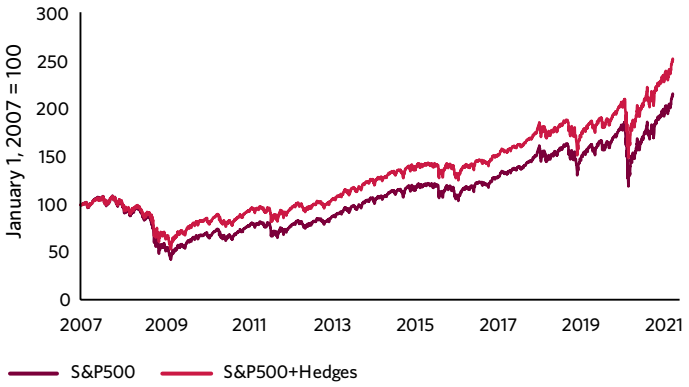
Bear market	2000 Dot Com Crash	2007 Great Financial Crisis	2020 COVID-19 Pandemic
Cause of the sellof	Overvaluation in the tech sector and 9/11	Over-leveraged financial system	Global health pandemic
Peak-through drawdown	-50%	-58%	-35%
Speed of drawdown	Slow	Medium	Fast
Duration	638 trading days	354 trading days	23 trading days
Recovery time	4.8 years	4.1 years	5 months

The information was prepared by CIBC Asset Management Inc. using the following third-party service providers' data: Bloomberg LLC.

In this paper, we have presented a range of practical risk mitigation strategies that derive performance from a diverse array of sources. To pass muster, they have to demonstrate an ability to mitigate the portfolio impact of significant equity drawdowns, while not incurring a long-term opportunity cost in terms of foregone expected returns due to a reduced strategic allocation to public equities.

To assess this ability we construct a simulation based upon a portfolio that combines a core equity allocation with the set of derivative hedging strategies presented above (Figure 19, & Table 1). We realize an improvement in long-term cumulative performance compared to the original equity-only portfolio. We also achieve an improvement in both the length and depth of drawdowns.

Figure 19 – Derivative hedging overlays can mitigate the impact of periodic significant equity drawdowns without foregoing long-term performance



The information was prepared by CIBC Asset Management Inc. using the following third-party service providers' data: Bloomberg LLC. Daily Data. Illustrative simulation. ComboHedges (CH) = equally weighted composite of the derivative overlay strategies discussed in this paper. Sample: January 2, 2007 – April 30, 2021.

Table 1 – Comparison of portfolio performance with and without derivative hedging strategies

Daily data	S&P 500	S&P 500 + Hedges
IR	0.36	0.45
Annualized return	7.56%	8.12%
Longest DD (#days)	1599	1396
Max Cumulative DD	-61.991%	-51.90%
Max 1-day DD	-10.96%	-9.94%
Skew	-0.56	-0.09

The information was prepared by CIBC Asset Management Inc. using the following third-party service providers' data: Bloomberg LLC. Illustrative simulation. Hedges = equally weighted composite of the derivative overlay strategies discussed in this paper. Sample: January 2, 2007 – April 30, 2021..

No two equity drawdowns are alike. To examine the robustness of our derivative overlay hedging strategies, we analyze performance in four discrete drawdown episodes: the 2011 Euro Fiscal Crisis; the 2013 U.S. Taper Tantrum; the 2015 Chinese Growth Slowdown; and the 2020 Covid Crisis. For each one, we examine the performance of the S&P 500 index compared to a portfolio that combines exposure to this index with an equally weighted composite of our derivative hedging strategies (Table 2).[7] In each episode, the portfolio incorporating hedging strategies outperforms, and the magnitude of drawdowns is markedly reduced.

Table 2 – The performance of our derivative hedging strategies appears resilient to scenario stress testing

a) 2011 Euro Fiscal Crisis

April 2011 - October 2011	S&P 500	S&P 500 + Hedges
Longest DD (#days)	108	108
Max Cumulative DD	-20.72%	-16.30%
Max 1-day DD	-7.50%	-6.30%

b) 2013 U.S. Taper Tantrum

May 2013 - October 2013	S&P 500	S&P 500 + Hedges
Longest DD (#days)	34	34
Max Cumulative DD	-5.74%	-5.17%
Max 1-day DD	-2.48%	-2.19%

c) 2015 China Growth Slowdown

August 2015 - November 2015	S&P 500	S&P 500 + Hedges
Longest DD (#days)	59	50
Max Cumulative DD	-11.08%	-9.12%
Max 1-day DD	-5.22%	-4.54%

d) 2020 Covid Crisis

Februry 2020 - March 2020	S&P 500	S&P 500 + Hedges
Longest DD (#days)	23	23
Max Cumulative DD	-35.95%	-29.09%
Max 1-day DD	-10.96%	-9.94%

The information was prepared by CIBC Asset Management Inc. using the following third-party service providers' data: Bloomberg LLC. Illustrative simulation. Hedges = equally weighted composite of the derivative overlay strategies discussed in this paper. Sample: January 2, 2007 – April 30, 2021..

Conclusion

Mitigating the impact of episodic, yet significant equity drawdowns on portfolio performance is a challenging endeavor. Every drawdown is triggered by a different catalyst and resolves according to a unique timeline and set of parameters. A lack of uniformity demands that proposed solutions encompass breadth, diversification, and rigorous portfolio management.

In this paper, we have presented a number of candidate strategies. None are perfect, but all appear to offer incremental additivity. Many are encompassed by the CIBC MAARS fund. Tail risk mitigation at a reasonable price.

Let's connect

Should you have any questions about this report or anything else, please do not hesitate to connect:

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[2] MAARS also encompasses derivative hedging strategies similar to those discussed in this document, making it a broader strategy than most macro funds.
[3] Calculated over rolling 3-year periods.
[4] As at April 30, 2021. Annualized returns for CIBC Multi-Asset Absolute Return Strategy (Series O) - 1yr: 5.6%, since inception (Oct 22, 2018): 6.6%.
[5] We anchor our illustrative hedging derivative strategies on the S&P 500, given the liquidity of this market index.
[6] A short (or credit) put spread involves concurrently selling and buying puts on the S&P 500 index with the same expiration date. The short put position has a higher strike price than the long (which is included to limit the risk of the position), thereby generating a positive net premium to the seller. This premium is used to fund the long Call position on the Vix futures contract. We note that this strategy has some associated basis risk, and so is not a perfect hedge.
[7] We allocate 90% of our illustrative portfolio capital to equities and 10% to our composite hedging strategy.

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