Marketing communication. Capital at Risk

INDEPTH

Option-based Equity Downside Protection

July 2024

Understanding option-based Equity Downside Protection Overlay Strategies

In today's dynamic and often volatile financial markets, we believe that the need for effective risk management strategies has never been more critical. Option based Equity Downside Protection Overlay strategies represent a **set of proactive measures designed to shield investors against the impact of severe market corrections**. These strategies aim to provide a robust defence mechanism, allowing investors to navigate through challenging market conditions with resilience and confidence.

A very large universe of possible strategies

When designing Equity Downside Protection Overlay strategies, we **carefully select the combination of derivatives tailored to suit specific risk management objectives** as well as evolving market conditions. Moreover, we need to consider on the run mark-to-market evolution and potential dynamic adjustment opportunities (passive modification, take profits, protection reset, optimised roll strategies, etc).

Examples of Strategies involving a combination of put options

Strategy Name	Instrument(s)	Strategy's advantage at inception	Market configuration where the strategy is most effective	Embedded risks
Put	Buy out-of-the-money put option to protect the portfolio against a fall in equity prices	High level of protection but at a high cost	**The closer the maturity** of the put option is to the **crash event,** the more beneficial it becomes.	All else equal, the option's value declines over time, **resulting at worst in the loss of the premium paid**
Put Spread	Buy a put option (e.g. a 12m 95% put) and simultaneously sell another put with a lower strike (e.g. a 12m 85% put)	Reduced level of protection but at a **more affordable price.** The strategy is the most cost-effective when the skew* becomes steeper, (leading to higher prices for the out-of-the-money put sold)	**The closer the market correction is to the maturity** and within the range of strikes of the put spread	A significant correction where the **underlying equity price drops below the strike of the put sold** (in the example loss higher than 15%)
Calendar Put - Spead	Buy a long dated put option (e.g. 12m 90% put) and sell short dated put options (e.g. 3m 70% put)	Lower level of protection at a significantly lower price due to volatility difference in the term structure. When the term structure is reverted, the strategy should be cheaper		A **substantial downturn occurring early in the strategy's lifespan,** where the underlying equity price drops below the strike of the put sold

Source: AXA IM as of 31st May 2024. For illustrative purposes only

Examples of strategies that combine puts and calls to lower hedging expenses while sacrificing some potential gains.

Strategy Name	Instrument(s)	Strategy's advantage at inception	Market configuration where the strategy is most effective	Embedded risks
Calendar Collar	Buy a long dated put option (e.g. 12m 95% put) and sell short-dated call options (e.g. 1m 10% delta call)	This strategy offers **efficient protection at a reduced cost**. The cost decreases as long-term volatility becomes more affordable and can be financed by selling high-priced short-term volatility.	At the onset of a correction, **when the downward trend is robust.**	A s**udden increase in market** prices leading to **losses from selling call options**.
Zero Cost Collar	Buy a put option (e.g. long a 12m 95% put) and simultaneously sell a call with a strike price such that the total premium spent equals zero	**No premium paid at inception** Ideal when call volatility is high, enabling the sale of Out of theMoney (OTM) call options to finance the purchase of less OTM put options.	At the onset of a correction, **when the downward trend is robust**.	A **rapid surge** in underlying equity prices resulting in losses from the sale of the call option. Sensitive to upward movements in bear markets.
Zero Cost Put Spread Collar	Buy a put spread option (e.g. long a 12m 95% put / short a 12m 85% put) and simultaneously sell a call with a strike price such that the total premium spent equals zero	**No premium paid at inception** Optimal when call volatility is high, allowing for the sale of OTM call options, and when the skew of the put wing becomes more pronounced, reducing the price of the put spread.	A **correction occurs**, causing the underlying equity price to drop between the strikes of the put options.	A **significant correction** where the underlying equity price drops below the strike of the put sold A **rapid surge** in underlying equity prices resulting in losses from the sale of the call option. Sensitive to upward movements in bear markets.

Source: AXA IM as of 31st May 2024. For illustrative purposes only

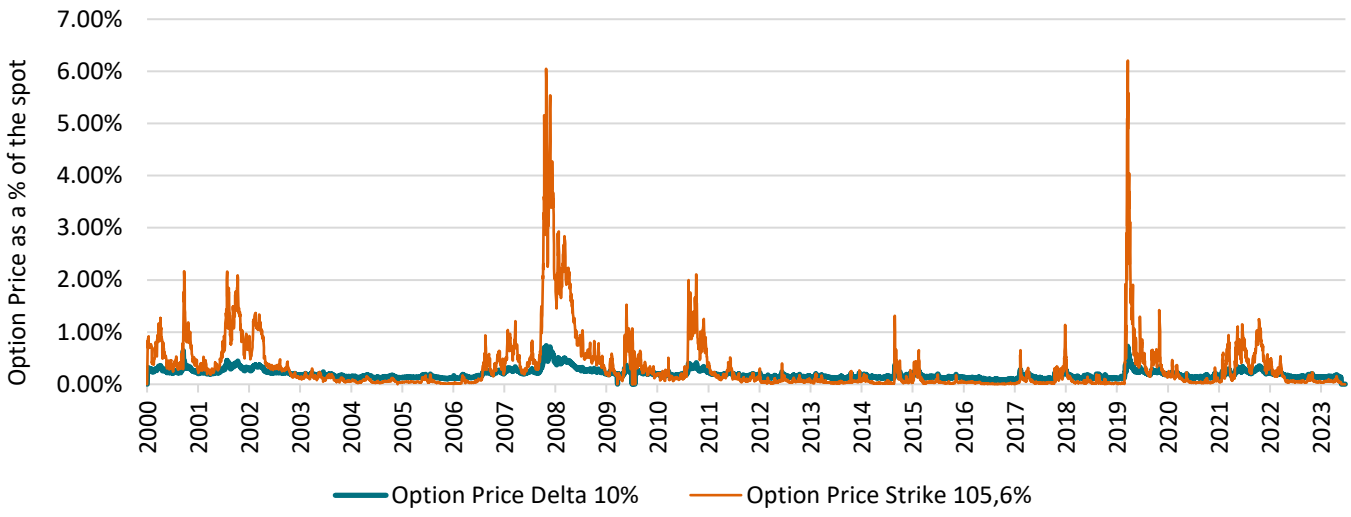
The basics of option-based strategies optimisation

Strike and maturity of the options selected are critical in the definition of the strategies, but other factors must be considered, depending on the option market (e.g skew) or the implementation methodology. Some of them should be optimised at inception of each individual strategy to optimise their cost, others during the initial design phase.

	AXA-IM preferred alternative
Strike	Implicit strike based on the **target delta**.
Maturities	Option's maturity determined based on a combination of our **market outlook** and analysis of the t**erm structure**. Lengthen the duration of the protection leg when the term structure flattens. Shorten the duration of the call within a call overwriting strategy when the term structure is inverted.
Skew	Privilege put spread strategies when the skew is steep, outright puts otherwise
Staggered implementation	A must whatever the strategy to increase protection robustness and consistency of sensitivities over time and avoid pinpoint effects.

Strike of the options:

At AXA IM, we believe it is better to **strike an option using its delta** instead of relying on its moneyness (as the ratio between the strike price and the spot price). Defining an option strike through its delta brings value because the delta measures its price sensitivity to changes in the underlying equity price, providing a **more dynamic and precise understanding of the option's expected sensitivities**. Keeping all other factors unchanged, using delta as the definition key metric results in a more stable premium over time and reduces its sensitivity to market volatility.



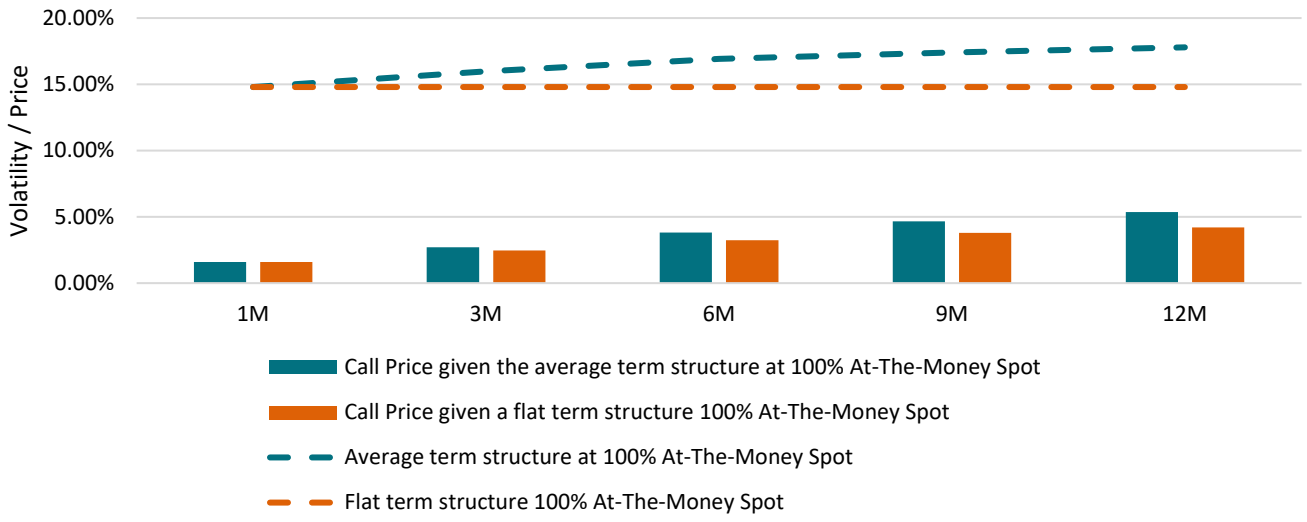
Source : AXA IM and Bloomberg, data covers the period from December 29th, 2000, to December 29th, 2023. For illustrative purposes only.te S&P 500 Price Return index was used as the underlying of the option. The option priced is a 1-month call option (22-day maturity). The daily performances are presented in a logarithmic manner. Past performance is not indicative of future returns.

Although the average forward moneyness corresponding to a 10% delta 1-month call option is 105.6%, the price patterns over the past 20 years of 1-month 10% delta & the one of the 105.6% strike options are markedly different. The 10% delta **option price pattern is more stable over time, offering an improved visibility on the premium paid and on the overall cost including opportunity cost of the options strategy considered.**

Maturity:

The optimal maturity of an option is best defined by considering the specific investment objectives, **market conditions**, and the forecast of the underlying's price movements. But when considering the volatility term structure, the optimal maturity of an option can be defined by analysing the **shape and dynamics of the volatility curve over time**. This analysis involves assessing how the implied volatility of options with different maturities evolves and factoring this information into the decision-making process to determine the most suitable option maturity.

Fig 3: Impact of the Call option's maturity on price



Source: AXA IM, Bloomberg as of May 22nd, 2024. For illustrative purposes only. The option's underlying is the S&P 500 Price Return index. The volatilities used to price the different options is either the daily average since April 22nd, 2013 of the 1-month 100% At-the-money Spot implied volatility (clear blue flat term structure), or the daily average term structure observed since April 22nd, 2013 (dark blue upward sloping term structure). The daily performances are presented in a logarithmic manner. Past performance is not indicative of future returns.

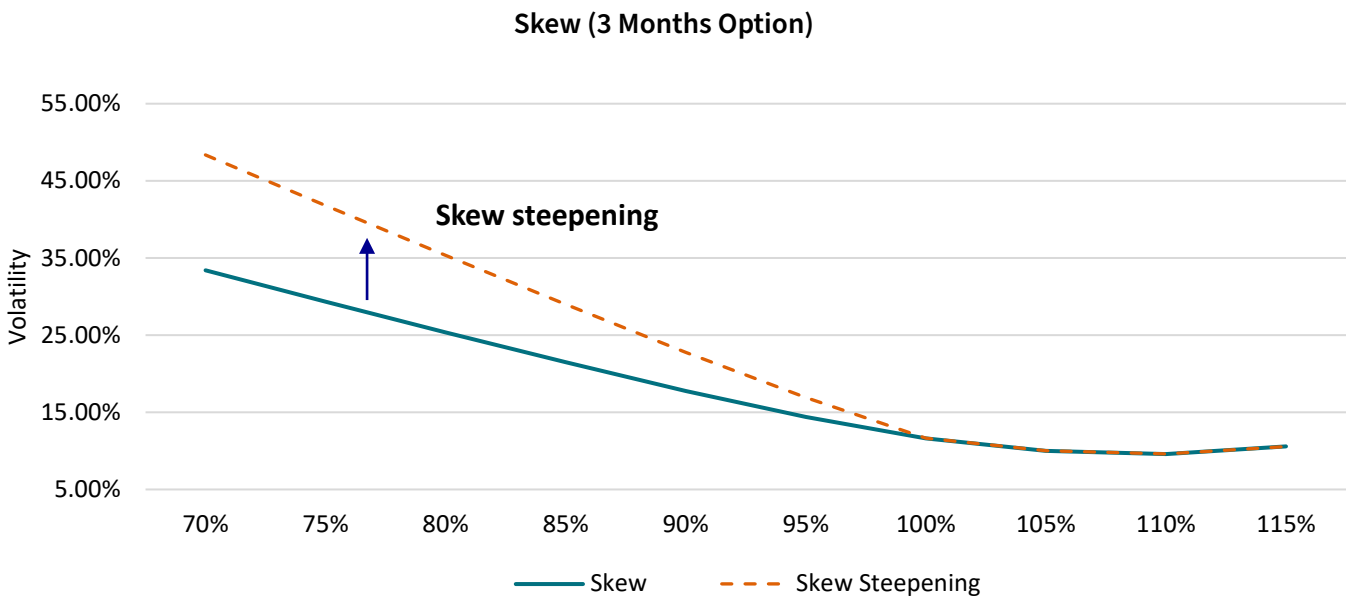
In this example, we may consider options with extended maturities in the case of a flat volatility term structure. The additional premium amounts to 2.3% for lengthening the tenor from 6 months to 12 months when the volatility term structure is upward sloping, whereas it is only 1.7% when the volatility term structure is flat.

At AXA IM, **we systematically analyse the term structure and the relative cost-effectiveness of tenors to select the most suitable one.**

Skew analysis:

As for the term structure, the skew as to be analyszed before each option implementation. When the left side of the skew is steepening, a Put Spread Strategy may be beneficial, as it lowers the overall option premium (compared to a Put Strategy) while maximising the premium gained from selling the more OTM put option. On the other hand, buying a slightly OTM put option might be the most effective strategy when the skew is flattening.

At AXA IM, we assess the skew to determine the most suitable strategy—either a Put or a Put Spread Strategy—and identify the optimal strike or the best pair of strikes accordingly.



Source: AXA IM as of 31st May 2024. For illustrative purposes only

Implementation considerations

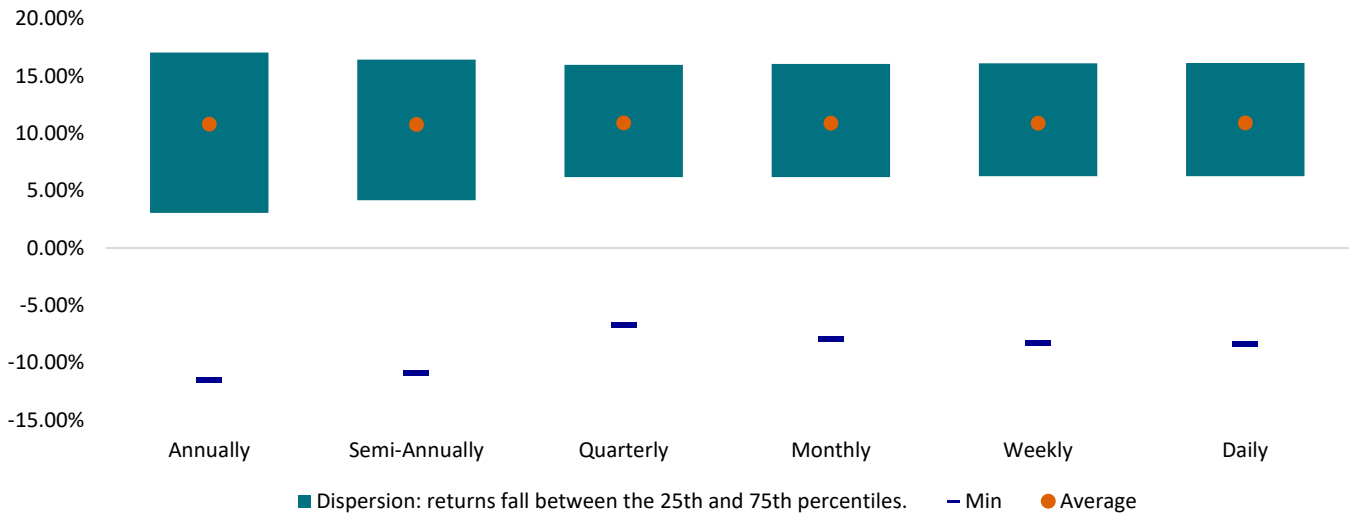
Option staggering strategies allow investors to purchase options at different dates, thus benefiting from different entry levels and expiration dates, rather than buying a single option with a single-entry level and expiration date.

The objectives of this implementation strategy are to:

- Foster diversification and robustness of the overlay sensitivities to market conditions,
- Smooth out the costs of acquiring options as well as the underlying asset entry levels,
- Reduce the impact of price fluctuations,
- Minimise the investor's exposure to short-term market fluctuations by considering changes in market conditions over a longer period,
- Take advantage of market scenarios occurring at different times by investing in options with different expiration dates.

It enhances the resilience of the implementation.

Fig 5 Staggering Frequency



Source: AXA IM, Bloomberg data covers the period from September 19, 2003 to September 29, 2023. The option's underlying is the S&P 500 Price Return index. For illustrative purposes only.

The analysis of the annual returns of a staggering strategy (1-Year 90% Moneyness Forward Put) shows that increasing the staggering frequency can help minimise variations in observed returns. **Smoothing the notional over time reduces the maximum loss and the volatility of the strategy. The benefits associated with an increased frequency become marginal beyond a monthly step. These parameters are key to determine the efficience of the strategy.**

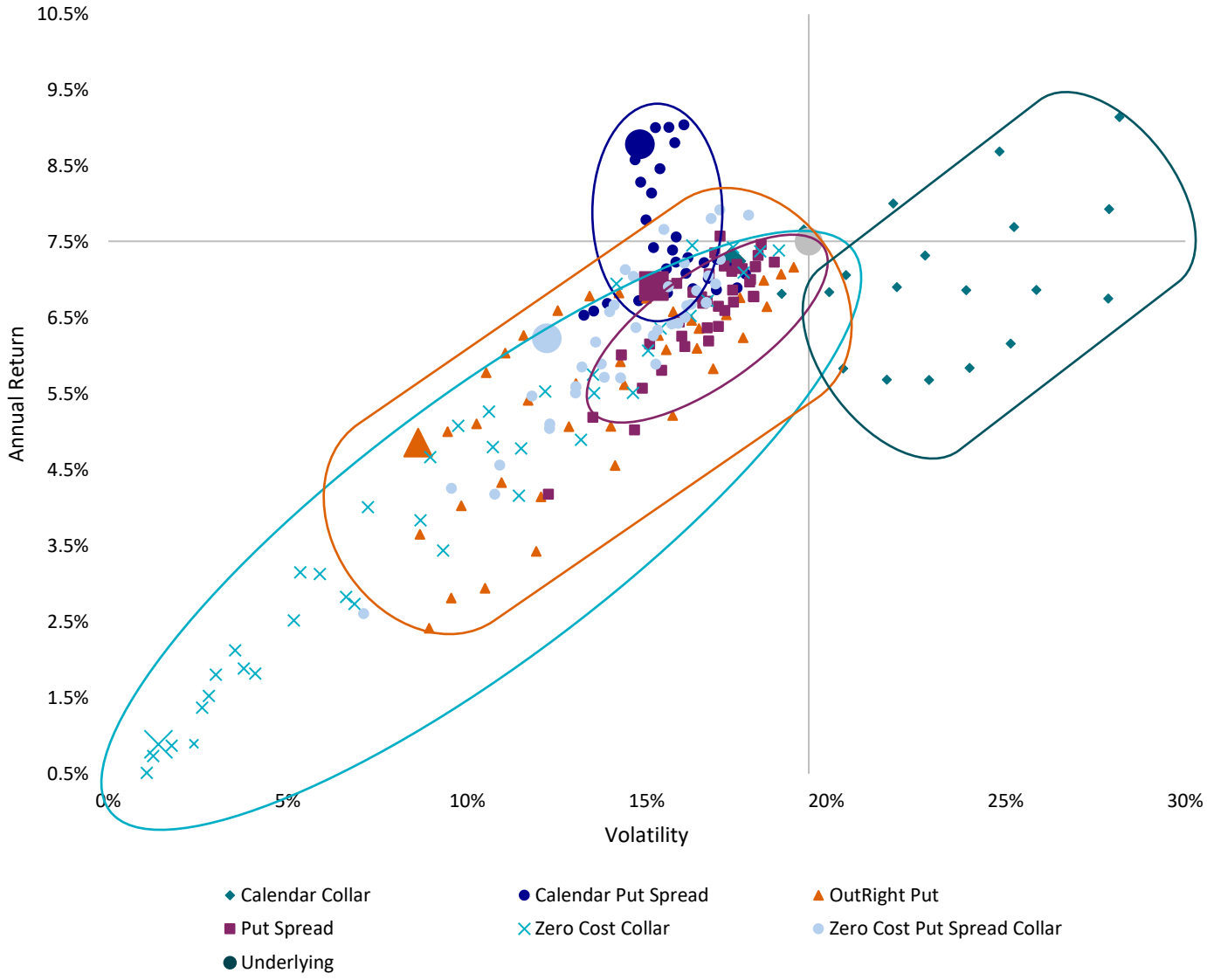
Strategies sensitivities to the parameters

For the six aforementioned options strategies, we have established a set of parameters, adjusting the option's maturity from 1 month to 24 months and the moneyness by increments of 5% from 100% to 70%.

The risk-return analysis based on four outputs (Performance, Volatility, Return/Volatility, Max Drawdown) is presented below for each strategy and compared with the S&P500 Net Total Return (NTR), including the average level, minimum, maximum, and the best sub-strategy among the back tested set for each output. The strategies are ranked according to the average level of each output.

	Strategy	Average	Min	Max	Best Sub-Strategy per Strategy
Annualized performance	Calendar Put Spread	7.6%	6.5%	9.0%	Calendar Put Spread 1x[24M-100] -1x[3M-90] rolled at maturity
	S&P500 NTR	**7.5%**			
	Calendar Collar	7.1%	5.7%	9.1%	Calendar Collar 100-3M rolled at maturity
	Put Spread	6.6%	4.2%	7.6%	PutSpread 24M 85-75 rolled at maturity
	Zero Cost Put Spread Collar	6.2%	2.6%	7.9%	ZeroCost PutSpread Collar 1M 85-75 rolled at maturity
	OutRight Put	5.5%	2.4%	7.2%	OutRight Put 1M 70 rolled at maturity
	Zero Cost Collar	4.1%	0.5%	7.5%	Zero Cost Collar 1M 85 rolled at maturity
Annualized volatility	Zero Cost Collar	9.5%	1.1%	18.7%	Zero Cost Collar 1M 70 rolled at maturity
	OutRight Put	13.7%	8.6%	19.1%	
	Zero Cost Put Spread Collar	14.5%	7.1%	17.8%	ZeroCost PutSpread Collar 1M 85-80 rolled at maturity
	Calendar Put Spread	15.7%	13.2%	17.8%	Calendar Put Spread 1x[6M-70] -1x[3M-65] rolled at maturity
	Put Spread	16.6%	12.3%	18.5%	PutSpread 1M 85-80 rolled at maturity
	S&P500 NTR	**19.5%**			
	Calendar Collar	23.0%	17.4%	28.2%	Calendar Collar 100-3M rolled at maturity
Maximum Drawdown	Zero Cost Collar	-30.9%	-55.8%	-8.0%	Zero Cost Collar 24M 97,5 rolled at maturity
	OutRight Put	-40.3%	-57.4%	-21.2%	
	Calendar Put Spread	-41.9%	-52.9%	-32.8%	Calendar Put Spread 1x[24M-80] -1x[3M-70] rolled at maturity
	Zero Cost Put Spread Collar	-43.9%	-51.4%	-21.3%	ZeroCost PutSpread Collar 1M 100-90 rolled at maturity
	Put Spread	-48.4%	-53.4%	-33.1%	PutSpread 1M 100-90 rolled at maturity
	S&P500 NTR	**-55.7%**			
	Calendar Collar	-58.4%	-67.7%	-41.4%	Calendar Collar 80-3M rolled at maturity
IRR/Vol	Calendar Put Spread	0.49	0.39	0.59	Calendar Put Spread 1x[24M-90] -1x[3M-80] rolled at maturity
	Zero Cost Collar	0.46	0.36	0.63	Zero Cost Collar 6M 100 rolled at maturity
	Zero Cost Put Spread Collar	0.43	0.37	0.51	ZeroCost PutSpread Collar 1M 95-85 rolled at maturity
	OutRight Put	0.41	0.27	0.56	OutRight Put 12M 100 rolled at maturity
	Put Spread	0.40	0.34	0.46	PutSpread 12M 100-90 rolled at maturity
	S&P500 NTR	**0.38**			
	Calendar Collar	0.31	0.24	0.42	Calendar Collar 80-3M rolled at maturity

Source: AXA IM as of 31st May 2024. For illustrative purposes only



an investor will focus on the upper left corner of the graph, where strategies offer higher returns but with lower volatility, such as the Calendar Put Spread.

Source: Bloomberg, AXA IM. For illustrative purposes only. No actual portfolio is managed with the same characteristics

Back tested returns of 212 strategies as of March 29th, 2024 and on the basis of the following: Period from January 1th, 2000, to March 29th, 2024, based on the S&P 500 Net Total Return index, gross of management fee and net of transaction costs.

Simulated results have many inherent limitations. In particular, simulations are performed with a limited number of variables and are based on historical data or assumptions as trade execution and market impact cost that may be different of the actual data and could evolve in the future. Additionally, simulated returns are often prepared with the benefit of hindsight, meaning that models used in these simulations may have been developed explicitly with the benefit of data from the time period covered by these simulations.

There can be no assurance that the models will remain the same in the future or that an application of the current models in the future will produce similar results because the relevant market and economic conditions that prevailed during the hypothetical performance period will not necessarily recur. These simulated returns should not be relied upon and no representation is being made that any strategy will or is likely to achieve profits or losses similar to those shown herein. Past performance is not indicative of future returns

The back tested strategies show the **sensitivity of the results in terms of performance and maximum drawdown to the chosen option parameters**. While, on average, **most strategies provide an internal rate of return (IRR)/Volatility (Vol) above the index**, except for the calendar collar, there are **hidden disparities behind this average**.

For instance, the IRR/Vol of the back tested outright put strategy ranges from 0.27 to 0.56. In terms of performance, the Zero Cost Collar's performance varies from 0.5% to 7.5%.

The other conclusion drawn from the back testings (2nd graph) is that the outputs of **some option strategies are more sensitive to options parameters than others**. For instance, Calendar Put Spread and Put Spread are less sensitive to options parameters (their respective circles, orange and yellow, have a smaller area than that of Zero Cost Collar, which is more widespread).

Looking at **the best sub-strategies for each strategy** (the ones with a set of parameters outperforming other sub-strategies for the same strategy) based on the IRR/Vol perspective, we confirm that on a back tested basis, **all the top-performing strategies exhibit a higher IRR/Vol than the S&P500 with a lower Maximum Drawdown, highlighting the added value of well-calibrated options parameters.**

Equity Market	Annualized performance	Volatility	IRR/Vol	Maximum Drawdown
S&P500 NTR	7.5%	19.5%	0.38	-55.7%

Strategies : combination of puts	Annual Return	Volatility	IRR/Vol	Maximum Drawdown
OutRight Put 12M 100%	4.9%	8.6%	0.56	-24.8%
PutSpread 12M 100%-90%	6.9%	15.2%	0.46	-45.7%
Calendar Put Spread [24M-90%] -[3M-80%]	8.8%	14.8%	0.59	-36.3%

Strategies as of combination of puts and sale of calls	Annual Return	Volatility	IRR/Vol	Maximum Drawdown
Calendar Collar 3M 80%	7.2%	17.4%	0.42	-41.4%
ZeroCost PutSpread Collar 1M 95%-85%	6.2%	12.2%	0.51	-35.9%
Zero Cost Collar 6M 100%	0.9%	1.4%	0.63	-10.6%

Source: AXA IM as of 31st May 2024. For illustration purposes only

Only the Calendar Put Spread 24M 90% - 3M 80% strategy displays a higher IRR than the S&P over the period with an IRR/Vol of 0.59. The outperformance of Calendar Put Spread 24M 90% - 3M 80% may be explained by the fact that we purchase long-term protection, which typically has lower carrying costs, and sell short-dated OTM put options, benefiting from the skew of the put wing.

Therefore, while the primary objective of the strategies remains to provide some relief during market downturns, the sensitivity of the results in terms of performance and maximum drawdown to the chosen option parameters is critical. It means the design (including calibration but also implementation) of a specific protection option strategy in a given market scenario should be overseen by experts who have a deep understanding of overlay dynamics.

At AXA IM, in addition to offering a wide range of strategies, backed by powerful proprietary modelling and back testing tools, our dedicated derivative overlay team would structure the optimised solution to meet your needs. In a partnership mode, the team would work with you to select the right combination of options and the according implementation, keeping some flexibility on every step and possible to adjust the strategy with market dynamic or evolving needs. Working closely with our tier one trading department would allow us to provide tender offers to maintain the best possible execution costs over the time of the dedicated strategy. Reporting could also be detailed and customised depending on your needs.

FOR DEFINITIONS OF INVESTMENT TERMS PLEASE CLICK HERE TO REFER TO *THE GLOSSARY*

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