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Active Versus Passive Management in Covered Calls in the Digital Asset Markets

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1. Executive Summary

This is the first paper in a series of two. This paper utilises the LibertyRoad Capital proprietary Artificial Intelligence system and Machine Learning algorithms to test if active management of a Covered Call strategy in the Bitcoin derivatives market is beneficial or not. The Second paper[1]

Many studies of this subject have been made over time, and the academic evidence consistently points to passive benchmarks outperforming active management over both the short, medium and long term. In general the empirical evidence suggests that the fees paid for alpha management do not give an investor good value for money.

These empirical studies however have generally been applied to traditional markets. This paper is looking at the Bitcoin derivatives markets which have several important differences:

- They are extremely volatile. Implied Volatility is routinely over 100%.
- This is a Covered Call strategy, where there is limited upside (retaining premium received for selling calls) against unlimited downside (the underlying Bitcoin price moves through and above the strikes). Therefore the distribution of returns is extremely non-normal.
- The data set of history for Bitcoin derivatives is only available from April 2019.

It is important to note that this is an academic exercise where LibertyRoad's AI is directly comparing active versus passive over the same trade period, and has the same allowable universe of trades. The only difference is that the Active strategy employs Extreme Value Theory to actively increase or decrease risk, and that therefore subsequently allows the portfolio to be much more dynamic both in replacing stopped out trades, and taking profit on profitable trades and re-establishing trades to maximise the premium received (Theta).

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[1] Covered Call Strategies in the Bitcoin Options/Volatility Markets. DR Thompson. July 2023

Importantly all returns are in Bitcoin terms, so it is measuring real alpha. However in the real world, in a Covered Call strategy with zero leverage, with a USD denominated accounting system, an investor would achieve hugely different results on an unhedged portfolio, as the option strikes would simply be take-profit levels, while the underlying Bitcoin holding would greatly increase in USD terms as Bitcoin rallied into the Covered Call strikes.

The actual simulated returns are actually very similar to our LibertyRoad actual returns so we believe these results are very relevant and applicable, but LibertyRoad applies a further discretionary human overlay over implementing trades, which has an important contribution to overall alpha. Active simulated returns have an annualised return of around 30% whereas LibertyRoad's covered Call Strategy is currently returning around 45% p.a. but it obviously has many more parameters and complexities at play. The point of the exercise is not to explain the differences between 100% active and LibertyRoad, but to establish how important active management is in this type of strategy.

The results are crystal clear. **Active management of hugely non-normal return distributions such as Covered Call strategies are essential. Passive management since April 2019 would have been simply disastrous, primarily because of the high volatility and hugely skewed return distribution.**

2. Introduction

"Active Evil is better than Passive Good."

— William Blake

In 2021 of nearly 3,000 active funds supposedly generating alpha for their clients, and charging for it, only 47% outperformed passive ETFs in the same market. In essence, as an investor, you have a less than a coin toss chance of picking a manager than will break even against a passive counterpart, let alone convincingly outperform. And then you pay fees.

The debate about active versus passive management has intensified with the introduction of cheap ETF products and retail investors have encountered the words "alpha" and "beta" more and more often in the last decade.

I have to admit to bias in this debate. I founded and ran a successful hedge fund for 17 years, and then sold it to a AAA counterparty who wanted a proven alpha generator, and therefore I know real alpha is out there, because we delivered it. But statistics never lie. Active managers against passive managers perform even worse over the long term. Over a 10 year period, only 25% of all active managers beat passive counterparties[2] and among large cap equity funds, only 11% of actively managed large cap funds outperformed passively managed peers.

So what is going on? Why pay 2/20 for alpha that might not exist?

The answer lies in the nature of the product and the strategy. In any sector there will always be the cream of the crop managers who will outperform. Similarly, certain strategies massively benefit from active management, while others can take it or leave it.

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[2]

https://www.cnbc.com/2021/11/01/in-one-of-the-most-volatile-markets-in-decades-active-fund-managers-underperformed-again.html

So where does active management fit into a Bitcoin Covered Call Strategy? A very simple strategy at its heart, in a super volatile asset class. This paper will examine two outcomes utilising our proprietary Artificial Intelligence algorithms, and Machine Learning parameterizations to test if active management is beneficial to both returns and risk.

The results clearly show that active management of covered call strategies in Bitcoin are hugely valuable, and that a further human discretionary overlay provides additional benefits.

3. Covered Call Strategy

Active management refers to two distinct things.

Firstly and most importantly it refers to **active risk management**. Hedging where appropriate in volatile markets should in theory be an alpha generator, especially if the risk management is sophisticated and proactive.

Secondly, active management should involve **increasing alpha**. Taking profit and rotating the portfolio to achieve the maximum additive alpha to the portfolio.

These two points are extremely important in a Covered Call strategy in something like Bitcoin. Volatility is high, and on the downside, the underlying can rapidly move through top side strikes, and decisively impact performance quickly and permanently. In addition, volatility surfaces in these markets are imperfect, and change rapidly. Steep theta curves can flatten very quickly, and it is extremely important to dynamically adjust the portfolio to take advantage of these moves.[3]

In an unleveraged Covered Call Strategy Call options are written against an underlying core position, in this case Bitcoin. No more calls are written than the underlying principal investment, therefore no leverage is utilised. Writing Calls involves writing an option where the buyer has the right but not the obligation to purchase Bitcoin at the Strike Price of the underlying option. They have a fixed maturity and are generally Non Deliverable in nature. i.e. they are either cash settled in Bitcoin or in USD. Deribit, the largest Bitcoin derivative exchange settles options in Bitcoin, while in contrast the CME cash settles options in USD.

With a Covered Call Strategy, there are three broad outcomes. Let's assume Bitcoin is at 30,000, and we write a one month 40,000 Call against the underlying position.

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[3] A steep Theta slope refers to the premium that is accrued each day when an option is sold. The steeper the theta slope, the quicker the option price decays and the faster the theta accrues to the seller. Diagram 2 graphically represents this on a 3D live rendering of the volatility surface. The jagged mountains are steep theta environments, and you want to sell premium on the steepest slopes you can find.

1. Bitcoin moves lower during the month and fixes at 25,000 USD. In this case the Writer (seller) of the option retains the entire premium from the call options sold as a yield enhancement on the underlying Bitcoin investment.

2. Bitcoin moves higher during the month and fixes at 39,000 USD. In this case the writer of the options receives the entire premium for the calls sold, but they have also benefited from the spot market moving higher. So in this product, it is perfectly possible to make money in both bull and bear markets.

3. Bitcoin moves parabolically higher and fixes at 45,000 USD. In this case the writer of the option still retains the premium from the options, but they are granting the buyer of the calls the right to buy Bitcoin at 40,000, when the market is at 45,000, so in Bitcoin terms they will take a loss of the difference between the strike and the fix less the premium received.

These scenarios can be graphically represented as in Diagram 1. Above the 40,000 Bitcoin strike the profit from selling the option declines until it crosses the horizontal line and becomes a loss.

Diagram 1 - Payoff Graph for Short Call 40k Strike

Underlying BTC Price at Expiration

— P/L
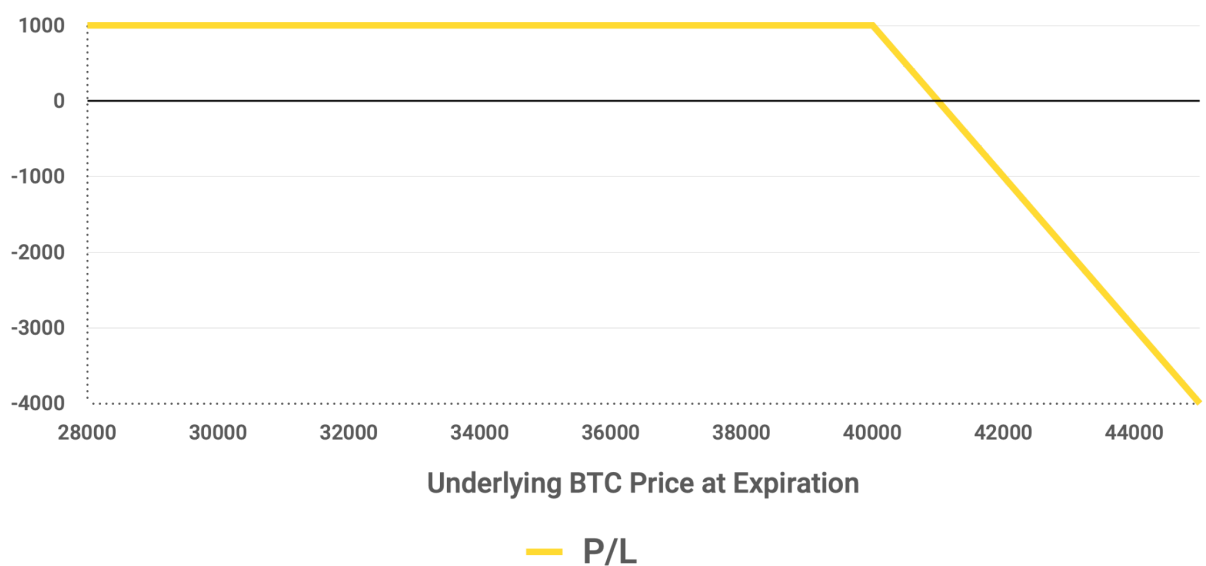
4. Active Risk Management

Many option strategies that are offered to investors contain no active risk management at all. The DeFi vaults for example sell calls or strangles and walk away. Over time it is hoped that the premium received will offset the occasional loss from a large move in the underlying. However, while historically in certain strategies even risk adjusted returns underperformed over time[4] clearly you would expect that with a strategy with a limited capped maximum return and unlimited potential losses, active strategy management makes sense.

Active risk management can take many forms. It can be simple, in that stops are applied at a certain loss level through an option strike or option value, or very complicated utilising cutting edge risk techniques. In this paper we are utilising Extreme Value Theory (EVT) to proactively manage risk based on calculating Value at Risk utilising EVT and modelling the active shorter term tails of a distribution using a Generalised Pareto Distribution (GPD) with a Peaks Over Threshold (POT) technique to model the extreme left hand tail.[5] This is the exact same risk management utilised by LibertyRoad Capital, and is built into our AI and Machine learning simulations that we are using to test new trade signals, and improving our parameterization and portfolio optimisation.

This generates a mathematical Extreme Value at Risk (EVaR) measurement which is actively used to increase or decrease risk in the portfolio relative to targeted and expected EVaR and initiate stops in rapidly moving market conditions.

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[4] https://www.evidenceinvestor.com/does-adjusting-for-risk-make-active-performance-any-better/

[5] LibertyRoad has a paper outlining how we calculate Extreme Value at Risk (EVaR) so please reach out if that is of interest, but it is beyond the scope of this paper.

5. Active Alpha Addition

Active management is also aimed at increasing the maximum alpha obtainable in a given period of time, with a given amount of risk. In this example when applied to Bitcoin covered call strategies, this takes two forms. Firstly it means that the **maximum inefficiencies on the volatility surface are exploited**. The volatility surface of an options market consists of a 3D representation of the market when taking into account volatility, term and a proprietary calculation of moneyness.[6] This has the benefit of generating the maximum amount of premium (theta) while generating the minimum amount of rate of change of an options delta (gamma), which is the desired outcome when selling Bitcoin calls.[7]

Active management then involves monitoring the descent of an option down the steepest theta surface, and monitoring the gamma and theta ratio and dynamically adjusting the portfolio and rolling the options positions to constantly take advantage of the most theta available on the volatility surface while giving up the least gamma. By definition this is a dynamic actively managed process.

Secondly it involves **active portfolio management by experienced Portfolio Managers** who can react to market events, and/or can apply real world filters to algorithmic trade signals to both improve return and hopefully reduce risk. Clearly efficient trade execution is also very important in adding incremental alpha to performance. We have not examined this aspect of active management in this paper.

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[6] Moneyness describes the intrinsic value of an option's premium in the market. The definition of moneyness is not completely standardised, and you can see different definitions in the literature:
- the simple moneyness is SKSK (in some cases you will see KSKS)
- the log moneyness is lnSKlnSK
- the standardised log moneyness ln(S/K)σT√ln(S/K)σT

If the forward price FF is used in place of the underlying price SS you have (three definitions of) the *forward moneyness*. The forward moneyness is useful because it is more consistent with the way the Black Scholes formula works, it is more natural.

[7] Investors pay for gamma by paying with theta. If you are an investor taking a bid directional bet, by definition you want the maximum amount of gamma possible with the minimum amount of theta. i.e you are buying cheap optionality. The exact opposite applies to options sellers. They want to sell the most expensive options possible and give away the minimum amount of gamma.

Diagram 2 - Bitcoin Live Volatility Surface

This a screenshot of a live Bitcoin volatility surface as produced by the LibertyRoad User Interface (UI). The vertical axis is volatility, the horizontal left hand axis is moneyness, and the horizontal right hand axis is term. Very high peaks show high implied volatility and therefore high theta. The deep valleys show the opposite. An actively managed Bitcoin Covered Call strategy would look for opportunities to run down the steep theta "slopes".
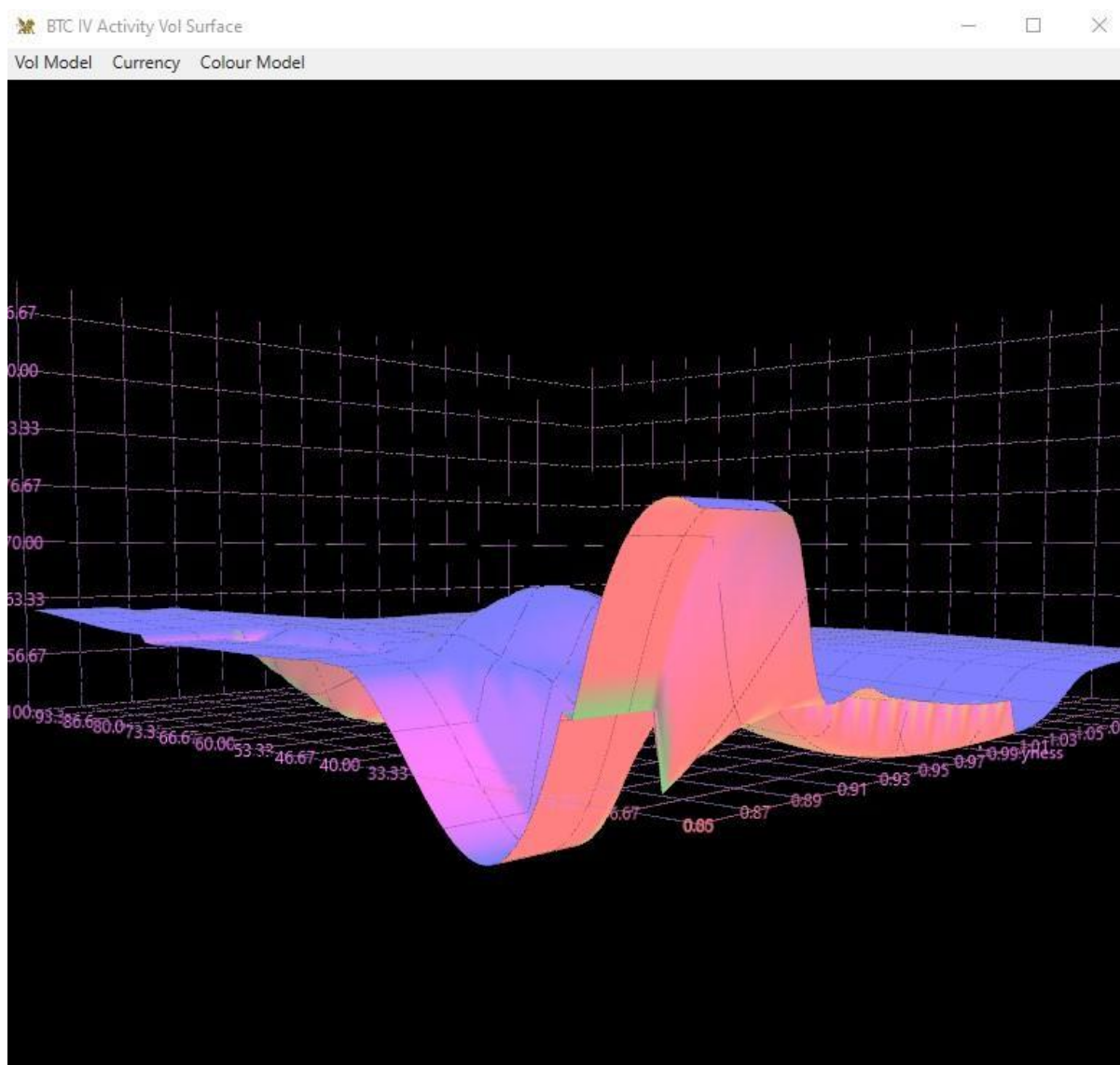
Diagram 3 – Maximising Theta versus Gamma

This is a screenshot of the LibertyRoad Gamma/Theta ratio matrix. It analyses the amount of Gamma given up for a given amount of theta. An actively managed strategy will also be managing the ratio between theta and gamma, and taking advantage of any discrepancies.

BTC — Gamma Theta Ratio x 100,000,000 — Calls

Strike	1JUN22	2JUN22	3JUN22	10JUN22	17JUN22	24JUN22	29JUL22	26AUG22	30SEP22	30DEC22	31MAR23	Strike
400000												400000
350000												350000
300000												300000
250000												250000
200000												200000
150000												150000
140000												140000
120000												120000
100000											-0.023	100000
90000										-0.023		90000
80000										-0.019	-0.016	80000
75000												75000
70000									-0.019	-0.015	-0.013	70000
65000									-0.016		-0.012	65000
60000							-0.022	-0.018	-0.013	-0.011	-0.022	60000
55000							-0.016	-0.014	-0.022	-0.020	-0.020	55000
52000						-0.021						52000
50000						-0.017	-0.011	-0.021	-0.018	-0.017	-0.018	50000
48000						-0.015	-0.020					48000
46000						-0.012	-0.017					46000
45000					-0.016	-0.010	-0.016	-0.022	-0.022	-0.016	-0.017	45000
44000						-0.019	-0.022					44000
42000						-0.014	-0.018					42000
40000				-0.016	-0.019	-0.016	-0.021	-0.022	-0.018	-0.021	-0.016	40000
38000						-0.020	-0.018	-0.020		-0.021	-0.016	38000
36000				-0.018	-0.018	-0.018	-0.020	-0.019	-0.016	-0.020	-0.016	36000
35000		-0.021	-0.018	-0.019	-0.020	-0.019	-0.019	-0.018	-0.016	-0.020	-0.016	35000
34000		-0.018	-0.019	-0.019	-0.020	-0.018	-0.019	-0.018	-0.016	-0.014	-0.016	34000
33000	-0.030	-0.017	-0.019	-0.019	-0.018	-0.019						33000
32500	-0.020	-0.018										32500
32000	-0.017	-0.017	-0.018	-0.018	-0.017	-0.018	-0.018	-0.018	-0.016	-0.014	-0.017	32000
31500	-0.019	-0.016	-0.017									31500
31000	-0.018	-0.016	-0.017	-0.016	-0.017	-0.016						31000
30500			-0.016									30500
30000			-0.014	-0.016	-0.016	-0.017	-0.015	-0.018	-0.016	-0.014	-0.017	30000
29500			-0.013									29500
29000			-0.011	-0.015	-0.015	-0.015						29000
28500												28500
28000			-0.010			-0.014	-0.016	-0.014	-0.017	-0.015	-0.018	28000
27500												27500
27000												27000
26000						-0.010			-0.012	-0.016	-0.019	26000
25000						-0.012			-0.013	-0.016	-0.010	25000
24000						-0.009			-0.014	-0.017	-0.010	24000
23000												23000
22000										-0.009	-0.011	22000
21000												21000
20000						-0.008			-0.009	-0.011	-0.012	20000
18000												18000

6. Simulated Active Management versus Passive Management Results

We ran our Artificial Intelligence algorithms using tick data from April 2019.Both strategies were allowed with the following parameters:

Passive:
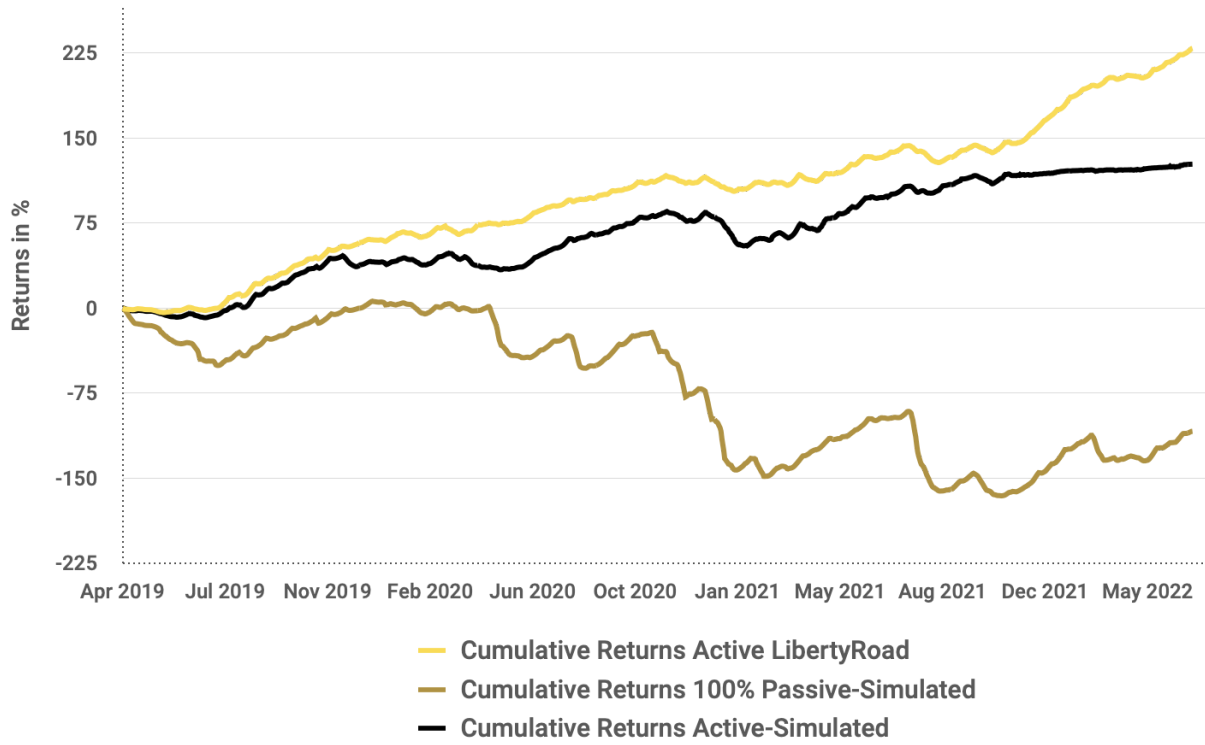- Maximum number of Trades 3
- Stop None
- Timeframe Weekly

Active:
- Maximum number of Trades   3
- Stop Determined by Dynamic EVaR
- Timeframe Weekly

The graph below highlights the performance of these two strategies since April 2019 as well as the returns from the Liberty Road Covered Call Strategy. As can be seen performance in the actively managed strategy is over 100% cumulative from 1 April 2019 to 25th May 2022. In contrast, the performance of a simple passive strategy with the same investment universe is -108% on a simple basis and -30.64% on an annualised basis. The evidence could not be clearer. Active management of these types of strategies are profoundly important.

Of course this is simplified. It is very unlikely that an investor would implement a rolling Bitcoin Call strategy and walk away and forget about it. Some form of risk management would undoubtedly be in place. Nevertheless it still makes an extremely valid point that active management in this type of strategy is clearly of utmost importance.

Simulated Returns of Active Versus Passive
Covered Call Strategies in Bitcoin since 2019

Cumulative Returns Active LibertyRoad

Cumulative Returns 100% Passive-Simulated

Cumulative Returns Active-Simulated

7. Conclusion

We have compared simulated returns for two strategies. A passively managed strategy with three active trades on a weekly trade signalling basis.

- The active strategy employs AI and Machine Learning to generate trade signals. The passive strategy sells calls each week with a constant delta and maturity of one week.
- Risk management is actively carried out utilising Extreme Value Theory on the active STrategy, and there is no risk management in the passive strategy.

It's a very simple but effective analysis. There are not many moving parts, and while the real world is much more complex, the point is definitely made and the results undeniable. Simple Active beats Passive comprehensively. The second paper in this series will analyse the real world returns from four different strategies;

- Ribbon - Simple Passive
- A Semi Active strategy employed by a well known Investment Manager
- A fully Active Strategy employed by a well known investment manager
- The Liberty Road Treasury Covered Call Strategy.

It is important to note that we have used the Treasury Covered Call product rather than our full volatility covered call product shown in this paper because it equates much better with the delivered levels of volatility from the other analysed programmes. (i.e. it is lower.)