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Research Reports

April 2021

Risk Management in the Cryptocurrency Markets

An analysis of Dynamic Hedging vs Options

Professional and institutional investors that want to benefit from the cryptocurrency markets will naturally also seek ways to minimise their risk. This report analyses two key strategies for hedging exposure to volatility in the cryptocurrency markets – buying options and dynamic hedging. Both strategies are well used in other sectors like the stock and commodity markets.

Hedging Approaches Covered in this Report

Options vs Dynamic Hedging

Options approach

For the purpose of this study we have considered 2 options strategies - purchasing At the Money Puts to protect the position as well as purchasing Puts that are 10% out of the money. In both cases we have purchased 30-day options on a serial basis so that as one series expires we purchase the next set of options at the new market levels.

We have not included selling Call Options which we consider more appropriately used for yield enhancement rather than as a hedging strategy. We have also excluded put spread strategies. This approach will be analysed in a future report.

Dynamic Hedging Approach

Dynamic hedging works on the assumption that markets are free flowing, liquid and ideally available for trading on a 24x7 basis. More suited than some markets to this technique, crypto is actively traded every day of the week and around the clock. Dynamic hedging works in the following way. Instead of buying an option to hedge an asset, the investor executes a partial hedge against the asset to protect against a downward market move. Clearly the hedge cannot be 100% otherwise the entire profit on the asset would be lost. The amount of the hedge is calculated using the option delta calculation on the 'strike price' that the investor wants to emulate. The option delta needs to be recalculated continually and the hedge on the asset increased or decreased depending upon market movement. The goal is to provide adequate protection against the market making large moves against the investor's long-term position.

Current Enhancements in Dynamic Hedging

In recent years new techniques have been developed to improve the results achieved through dynamic hedging. The most effective improvement is the use of AI models that analyse market conditions which are then used as a guide to deploy the dynamic hedging strategy.

During periods of high risk hedges are deployed, held for the period where market risk is at its greatest (based on the AI model assessment) then removed during low risk periods. This is the approach Panxora uses for our flagship Crypto I hedge fund. It is also the underlying technology of the cloud based RMaaS risk management service that is deployed through API onto client's cryptocurrency exchange accounts to manage volatility risk.

At the time this report is written, March 2021, cryptocurrency options are limited to bitcoin and ethereum. Dynamic hedging costs for both cryptocurrencies are significantly less than using the options market. The average implied option volatility is lower by approximately 30% when annualised. The dynamic hedging approach also generates a significant improvement in both the Sharpe Ratio and Sortino Ratio for both markets compared to simply holding the unhedged asset.

Bitcoin analysis

For our analysis of the bitcoin market we have chosen the period January 2018 through to January 2021 because it provides a comparison across all market types.

- 2018 - Bear market
- 2019 / 2020 - Recovery period followed by consolidation
- 2020 / early 2021 – Bull market

During much of this period there was no viable options market for bitcoin. For comparison purposes we have used annualised option volatilities of 85%, 100% and 115%. This is on the low side for large option hedge costs which often fall into the 100%-120% range. We believe this is reasonable because volatility prices are likely to fall as the market matures.

We have opted for an analysis using 30 day option hedges. This was chosen to reflect the volatile nature of the bitcoin market. Any longer term option would very quickly lose efficacy during a strong run-up and would require rolling into higher strike prices. Finally our analysis compares dynamic hedging versus buying At the Money put options and 10% Out of the Money puts.

Report Parameters

Time Period Jan 2018-Jan2021 (included)

Option Strategies

- Purchase Serial 30 Day ATM Put Protection
- Purchase Serial 30 Day Out of the Money (10%) Put Protection

Option Assumptions

- Central IV Rate. 80%
- Low Band IV Rate. 95%
- High Band IV Rate. 95%

Dynamic Hedging

- Medium Term Volatility Overlay (approximately 6 weeks)

Bitcoin | Basis of the study

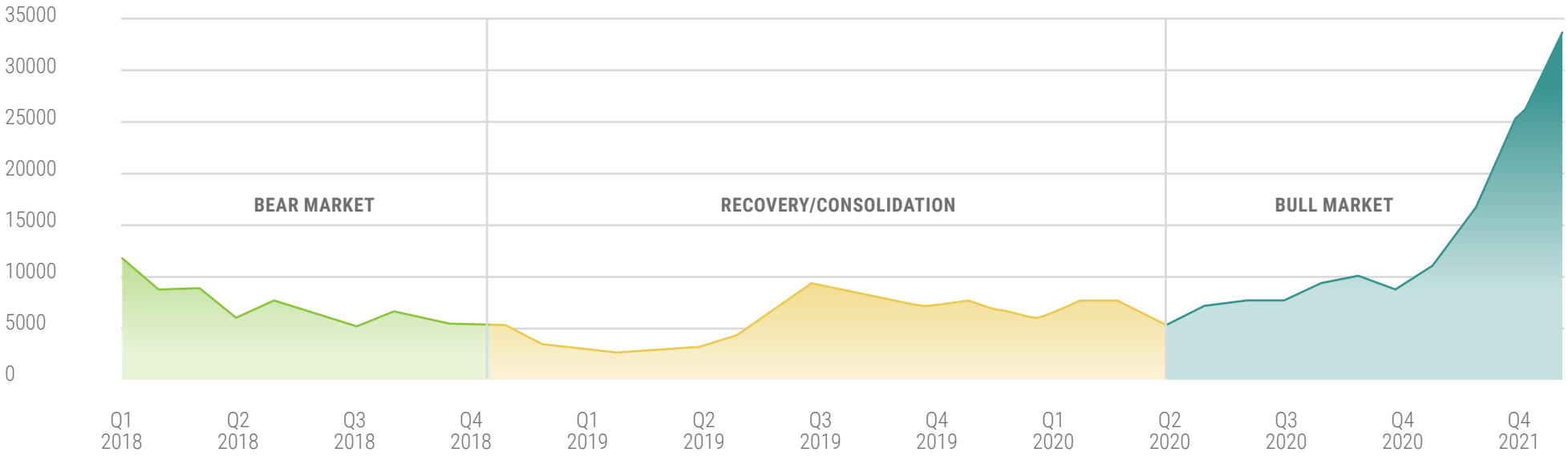


Table 1

Performance of buy and hold, dynamic hedging and option hedging

	Buy and Hold	Dynamic Hedging	At the Money Options	Out of the Money Options
Average Monthly Returns	4.81%	4.88%	2.64%	3.02%
Return Volatility (Annual)	79.22%	49.34%	55.7%	67.34%
Largest Up Month	+52.15% (May 2019)	+51.24% (May 2019)	+43.10% (May 2019)	+47.61% (May 2019)
Largest Down month	-36.42% (Nov.2018)	-9.22% (July 2019)	-9.06% Multiple	-14.54% Multtiple
Sharpe Ratio	0.96	1.56	0.66	0.64
Sortino Ratio	1.62	6.22	3.87	2.67

"If you can equal the risk adjusted returns by just buying and holding bitcoins then why bother following a hedging strategy at all?"

The table above shows the high level results comparing option hedging vs dynamic hedging. As can be seen from the summary table dynamic hedging has clear cost advantages over option hedging across even the lowest studied option volatility level.

We used the Sharpe and Sortino ratios as measures of risk adjusted returns. Sharpe ratio is universally used as a relative measure of returns vs absolute volatility. The Sortino ratio shows returns vs downside volatility. Many people prefer using the Sortino ratio since the concern of investors is downside volatility. Upside volatility is perceived as a benefit. The results confirm our hypothesis as dynamic hedging performs better than buy and hold across both measures, but the difference is particularly pronounced in Sortino ratio terms.

A view of absolute returns of the two strategies bears this out. The asset, when protected by a hedging strategy avoids some off the large drawdowns that are a regular occurrence in cryptocurrency markets (see Panxora Research Report on "The Volatility Profile of Bitcoins" published January 22, 2021).

Monthly Return Breakdown by Strategy

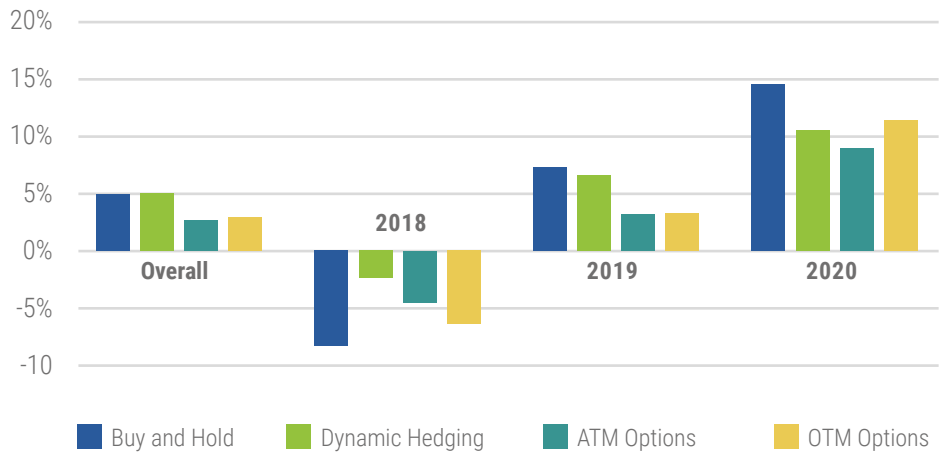


Table 2

Annualised Return Volatility

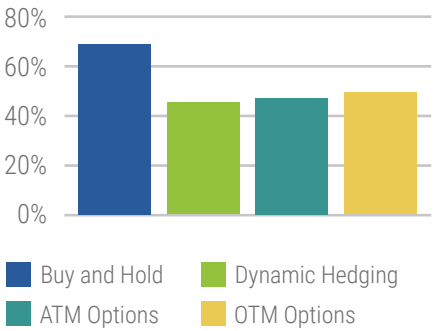
	Buy and Hold	Dynamic Hedging	ATM Options	OTM Options
Overall	79.22%	49.34%	55.70%	67.34%
2018	70.96%	17.15%	37.69%	48.83%
2019	74.19%	60.81%	59.77%	71.88%
2020	76.53%	50.97%	60.19%	69.47%

Table 3

Average Monthly Returns

	Buy and Hold	Dynamic Hedging	ATM Options	OTM Options
Overall	4.81%	4.88%	2.64%	3.02%
2018	-8.13%	-2.41%	-4.41%	-6.04%
2019	7.22%	6.28%	2.93%	3.21%
2020	14.54%	10.32%	8.90%	11.20%

Annualised Return Volatility (Overall)



We decided to drill down further and analyse the returns by year. This analysis provided additional insight into the relative strengths and weaknesses of the different approaches. As you would expect all strategies outperformed buy and hold during the bear market. The best outperformance was again seen using Dynamic Hedging, followed by the purchase of At the Money puts with Out of the Money puts lagging (less than half the average monthly performance of dynamic hedging).

The real difference to note is in the 2019 figures. During this year which saw some long periods of consolidation both option strategies underperformed both dynamic hedging and buy and hold. During the bull phase buy and hold outperformed all hedging approaches as the hedging costs reduced some of the gains seen by pure buy and hold.

Finally we looked at the risk adjusted returns of a portfolio protected with dynamic hedging vs simply buying and holding bitcoins. When we set out on this study we wanted to look at the added value that hedging provided to a portfolio holding of bitcoin. Over the period studied bitcoin has a Sharpe ratio of 0.96. While both options strategies performed worse than this, dynamic hedging fared much better. Dynamic hedging achieved a Sharpe ratio of 1.56 (over 50% higher than bitcoin alone). Using the Sortino ratio (a measure that focusses on downside volatility as risk) the difference is even more marked, buy and hold achieving 1.62 while dynamic hedging achieved 6.22. These differences highlight the value that hedging provides, eliminating many of the severe price drops that bitcoin remains susceptible to while benefitting from the upside potential.

"The asset, when protected by a hedging strategy avoids some off the large drawdowns that are a regular occurrence in cryptocurrency markets"

Conclusion

The analysis of the data really drives home the subjective view of many market participants that with the current volatility structure simple option strategies are simply too expensive to stack up against other hedging approaches.
While this makes long term option hedging unfeasible at the moment this is likely to change as the market matures.
Many new option markets exhibit the same tendency of overly high premium levels and wide spreads until the market matures and more liquidity drives those costs down.
Until that happens other hedging approaches are necessary to protect the value of larger holdings in cryptocurrency and reduce the volatility from these holdings.

> **Panxora's Risk Management as a Service delivers an effective way to manage the volatility on cryptocurrency holdings. Contact us to receive performance reports.**
> **reports@panxora.io**

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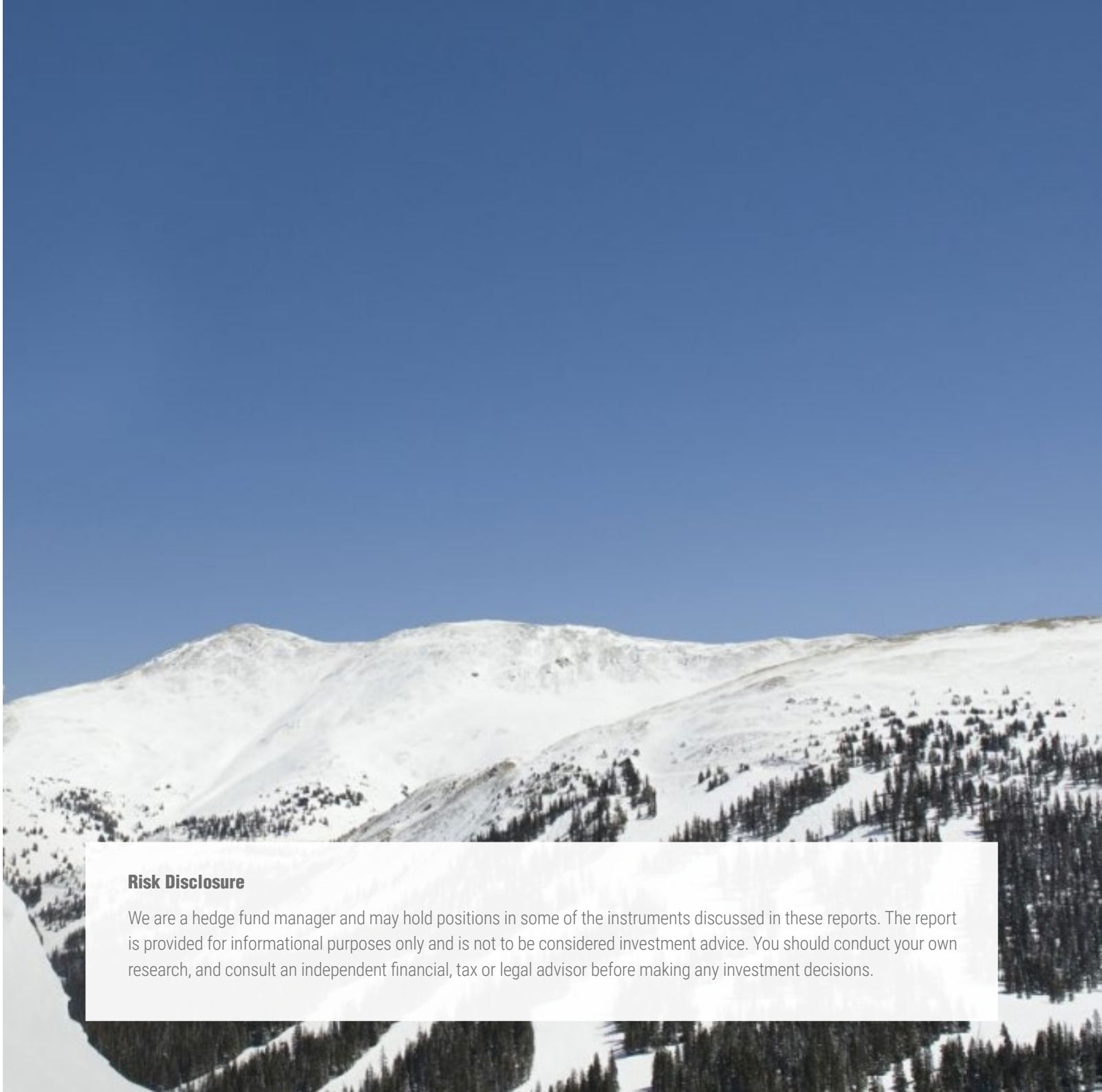

Risk Disclosure

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