

Bitwise

The Case for Crypto In An Institutional Portfolio

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Abstract

This report explores the case for including a small but meaningful allocation to cryptoassets in a diversified portfolio. Specifically, it examines the impact that a 1%, 5%, and 10% allocation to Bitcoin would have had on a traditional 60% equity/40% bond portfolio since Jan. 1, 2014.

The paper finds that allocating to Bitcoin would have significantly increased the portfolio's risk-adjusted returns, assuming the portfolio was systematically rebalanced over time. This result was consistent across all three allocations using multiple rebalancing strategies.

The potential impact was large: With a 5% allocation, for instance, the Sharpe ratio of the portfolio nearly doubled, total returns more than doubled, and the maximum drawdown was substantially reduced.

The paper finds that Bitcoin's unique combination of high potential returns and low correlations with traditional asset classes make it uniquely attractive as a diversifying asset for long-term investors.

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Overview: The Case for Crypto in an Institutional Portfolio

Cryptoassets exploded onto the national scene in 2017, as the price of Bitcoin rose from just over \$1,000 to a peak of \$19,783 on Dec. 17. Prices then fell sharply, with Bitcoin trading down 64% from its peak to end March 2018 just a shade above \$7,000. This whipsaw volatility left many investors wondering what role—if any—cryptoassets like Bitcoin might have in an institutional-caliber, diversified portfolio.

To answer this question, this study examined the performance of a traditional 60% equity/40% bond portfolio with and without an allocation to Bitcoin. Bitcoin was used as a proxy for the broader cryptomarket, because it is the largest cryptoasset and the one with the longest track record.

The study looked at the period Jan. 1, 2014 through March 31, 2018. This period was chosen because it captures two of the worst bear markets in Bitcoin history: The 85% pullback from January 2014 through January 2015, and the 64% decline from December 2017 through the conclusion of the study in March 2018. The study considered looking at returns since Bitcoin's inception on publicly available exchanges in 2010, but the early returns of Bitcoin were so high that they skew the analysis. In 2013, for example, Bitcoin's price rose 5,507% (see table). The chosen start date captures what amounts to the worst historical scenario for adding Bitcoin to a portfolio.

Despite this (intentionally) adverse timing, the study found that a systematic allocation to Bitcoin significantly increased the portfolio's risk-adjusted returns, assuming a diligent rebalancing strategy was in place. In fact, a small allocation to Bitcoin achieved this result without increasing the risk profile of the portfolio in any meaningful way.

YEAR	RETURN
2010 (Partial)	233%
2011	1,473%
2012	186%
2013	5,507%
2014	-58%
2015	35%
2016	125%
2017	1,331%
Q1 2018	-45%

The Impact of Bitcoin on a 60/40 Portfolio

To frame the analysis, the study began with a classic 60/40 portfolio, featuring a 60% allocation to the Vanguard Total World Stock ETF (VT) and a 40% allocation to the Vanguard Total Bond Market ETF (BND). VT holds a market-cap-weighted portfolio of global stocks covering 98% of the world's market capitalization, while BND holds a market-value-weighted portfolio representing all taxable, investment-grade U.S. bonds.

This portfolio (the "Traditional Portfolio") enjoyed solid returns over the study's time period, rising 26.53%. More importantly, returns were steady, with monthly volatility of just 6.5% and a Sharpe ratio of 0.80. The fund's worst drawdown was 11.37%, which occurred during the February 2016 pullback in global equity markets.

Returns for Traditional 60/40 Portfolio

● TRADITIONAL PORTFOLIO



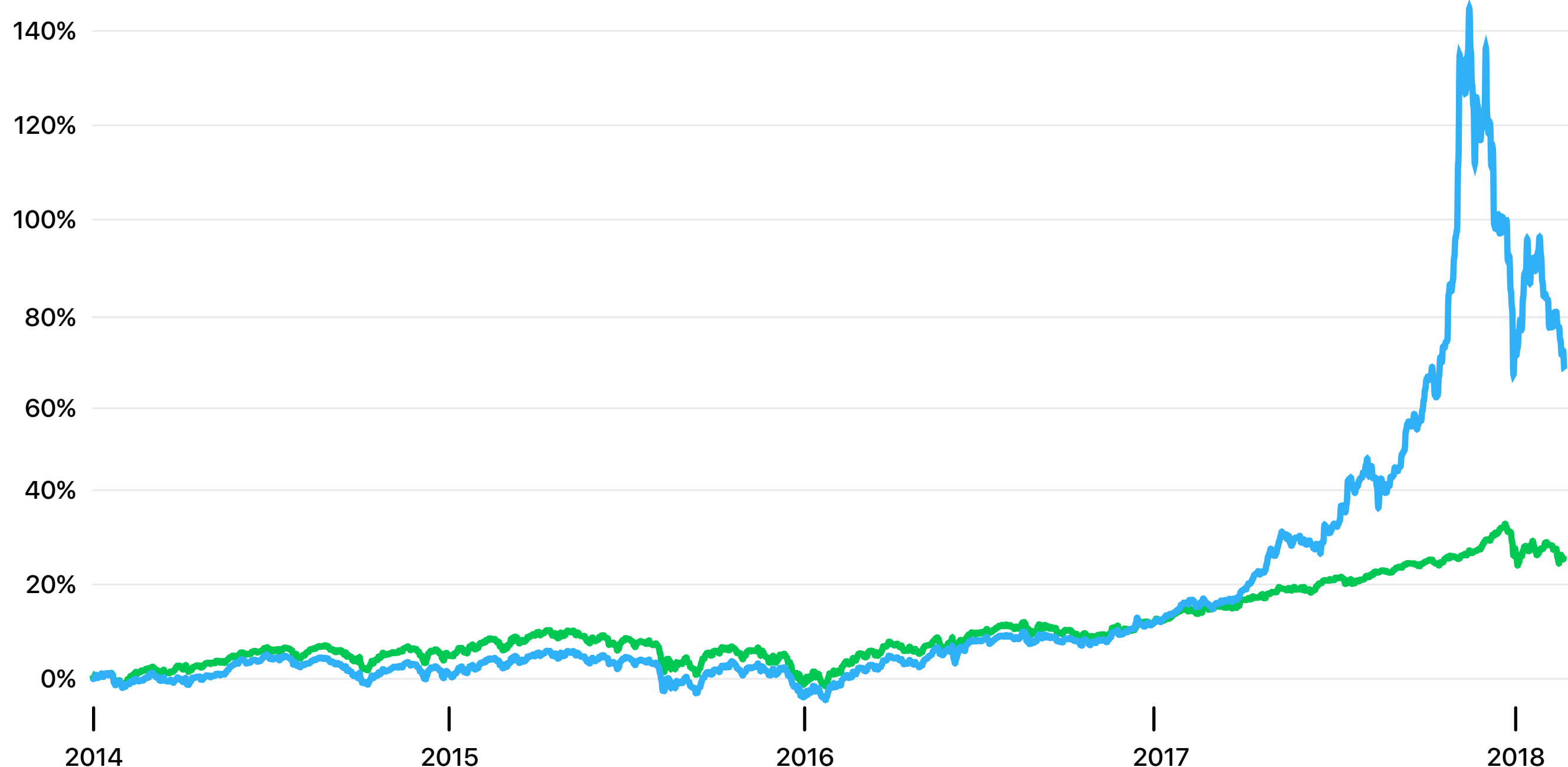
Adding a Naive 5% Allocation to Bitcoin

To evaluate the role of Bitcoin in a portfolio, the study looked at the impact of making a 5% allocation to Bitcoin and holding that position for the duration. The Bitcoin allocation was drawn on a pro-rata basis from the equity and bond positions, meaning the portfolio (which we will call the “HODL Portfolio”) started with a 57% allocation to stocks and a 38% allocation to bonds.

The impact of this small allocation was dramatic. Bitcoin’s strong performance during the study’s time frame powered the portfolio higher, with total returns jumping from 26.53% to 67.70%. Unfortunately, volatility soared as well, rising from 6.5% to 19.8%, and the maximum drawdown spiked from 11.37% to a frightening 32.68%.

Portfolio Returns With & Without a 5% Allocation to Bitcoin

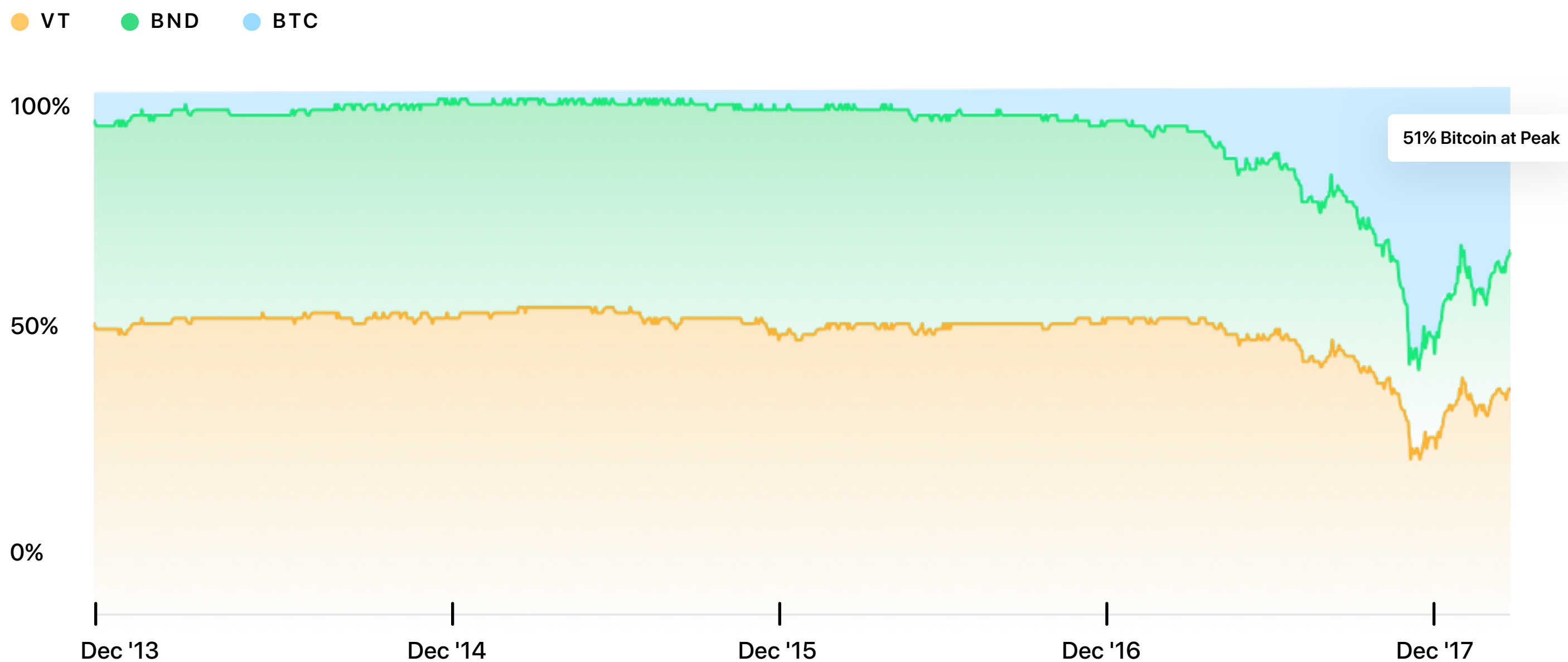
● TRADITIONAL PORTFOLIO ● HODL PORTFOLIO



The problem with this portfolio is that Bitcoin’s spectacular rise in price caused it to dominate the portfolio toward the end of the study, peaking at 51% of all assets in December 2017. This large allocation to a highly volatile asset created large risks in the portfolio, which manifested in overall high volatility and a very large drawdown in 2018.

Unfortunately, many crypto investors got themselves into exactly this kind of problem in 2017 by buying and holding their positions with no sell discipline. There is even a special term for this strategy in the crypto world: HODLing, an acronym used to mean **H**old **O**n for **D**ear **L**ife.

Asset Weight Over Time: HODL Portfolio



While the Sharpe ratio of the “HODL Portfolio” narrowly edges out the Traditional Portfolio (0.89 vs. 0.80), it’s not something anyone would want to own: The sky-high volatility, increased drawdown, and imbalanced asset weights make it inappropriate for serious investors.

The Value of Rebalancing Crypto-Enhanced Portfolios

The solution to this problem is obvious: rebalancing.

Rebalancing is standard practice for institutional-caliber portfolios. It keeps the targeted risk of the portfolio in line with investor expectations, and enforces a disciplined buy-low/sell-high discipline.

There are many different rebalancing strategies, but two dominate:

Time-Based Rebalancing: rebalancing the portfolio on a predetermined calendar basis (typically, quarterly, biannually or annually)

Tolerance Rebalancing: rebalancing the portfolio whenever an allocation gets away from its targeted allocation by a certain amount; e.g., when a 10% targeted allocation hits 15% or 5% (a 50% tolerance)

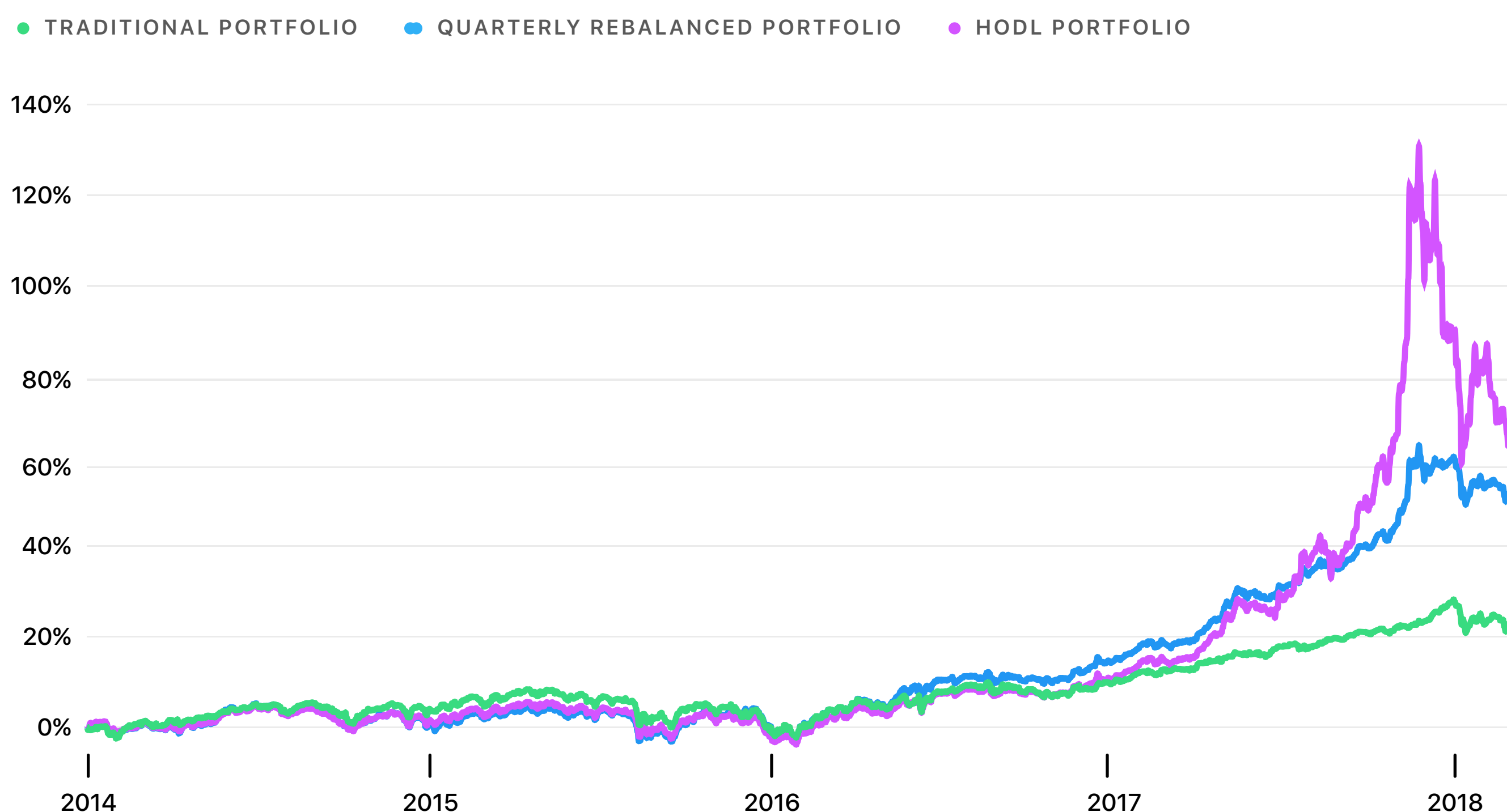
Time-Based Rebalancing

For this study, I looked first at Time-Based rebalancing using a quarterly rebalancing timetable.

The results were remarkable: The “Quarterly Rebalanced Portfolio” captured similar returns as the HODL Portfolio (58.51% vs. 67.70%), but did so with less than half the risk (9.0% vs. 19.8%). Quarterly rebalancing also massively reduced the maximum drawdown, which fell from -32.68% to just -9.25%. This drawdown was actually lower than the maximum drawdown experienced by the Traditional Portfolio (which didn’t hold Bitcoin at all).

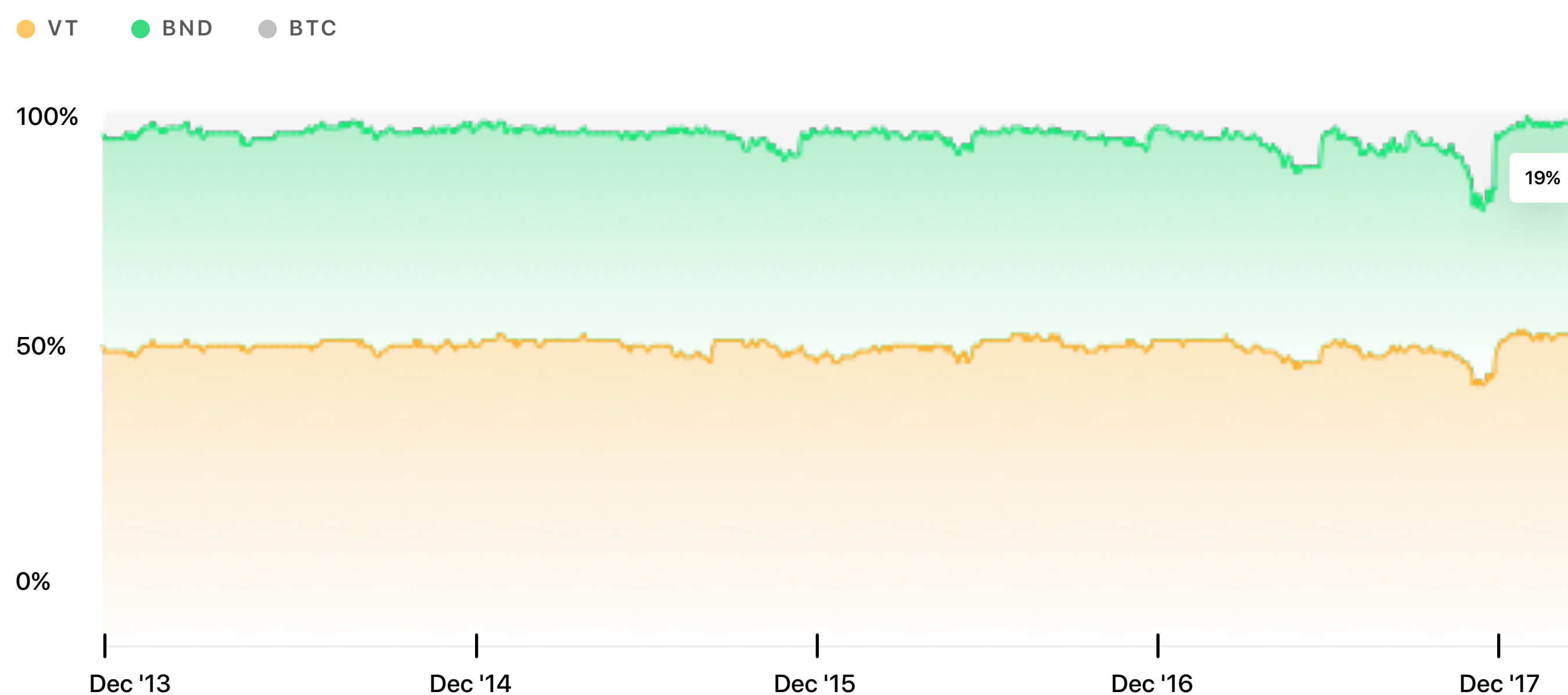
The Sharpe ratio for the Quarterly Rebalanced Portfolio was significantly higher than either the Traditional or HODL portfolios, clocking in at 1.61 vs. 0.80 for the Traditional Portfolio and 0.89 for the HODL portfolio.

Quarterly Rebalancing Led to Better Risk-Adjusted Returns



The quarterly rebalancing program also helped limit Bitcoin’s overweight: At its peak in December 2017, Bitcoin made up a little more than 19% of the total allocation. That is probably higher than most investors would (or should) be comfortable with, but it’s far lower than the 51% allocation in the HODL Portfolio.

Quarterly Rebalancing Reduced But Did Not Eliminate Allocation Issues



Tolerance-Based Rebalancing

In an effort to better constrain Bitcoin's weight in the portfolio, the study looked at a Tolerance-Based rebalancing strategy using a 50% tolerance. That meant rebalancing the 5% Bitcoin allocation any time it hit 7.5% or 2.5%. This substantially smoothed out portfolio weights, preventing the excessive weightings seen in the HODL and Quarterly Rebalanced portfolios.

Despite these constrained weights, the Tolerance-Rebalanced Portfolio created a similar outcome to the Quarterly Rebalanced Portfolio, and one that is massively better than the Traditional Portfolio. Total returns stayed strong, at 54.24%, more than double the Traditional Portfolio, while overall volatility came in at just 8.4% (vs. 6.5% for the Traditional Portfolio and 9.0% in the Quarterly Rebalanced Portfolio). Notably, the maximum drawdown fell to just -9.07%, substantially lower than the drawdown experienced in the Traditional Portfolio (-11.37%).

With a nice mix of substantially higher returns and reasonable risks, the Tolerance-Rebalanced Portfolio nearly doubles the Sharpe ratio of the Traditional Portfolio, from 0.80 to 1.55.

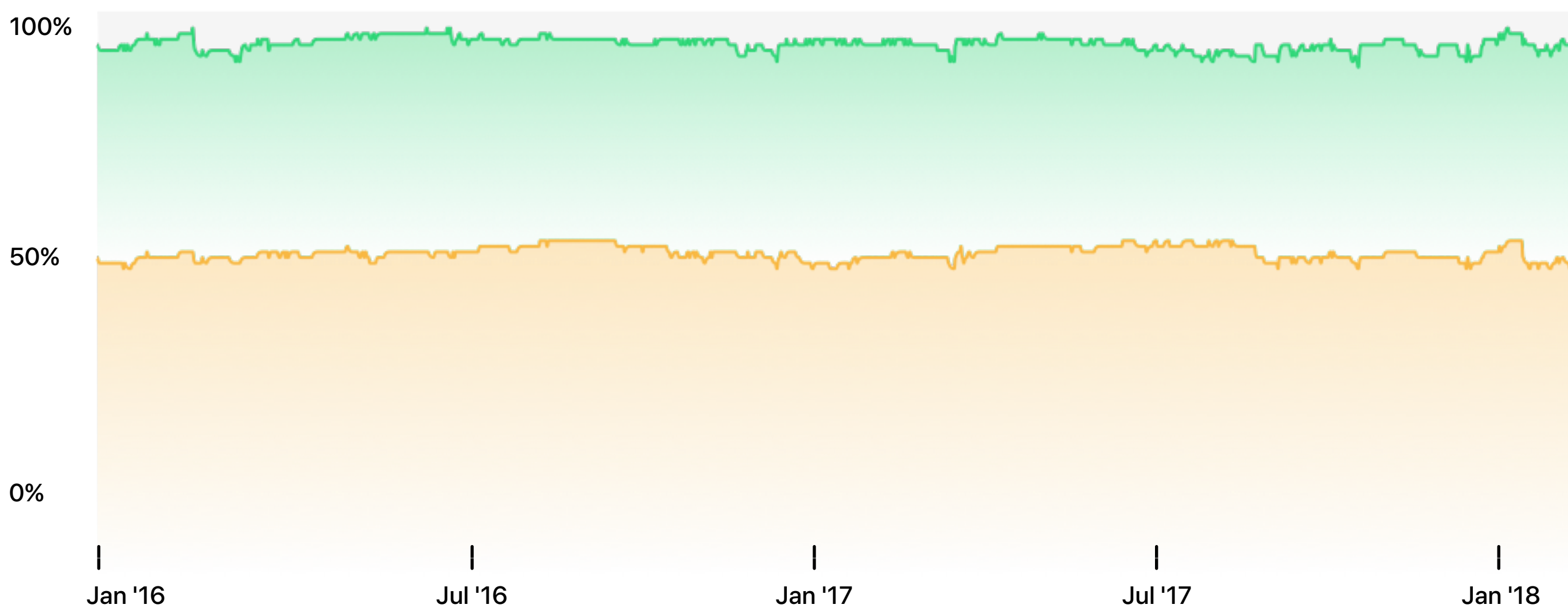
Tolerance-Based Rebalancing Led to Strong Risk-Adjusted Return

● TRADITIONAL PORTFOLIO ● TOLERANCE-BALANCED PORTFOLIO



Tolerance-Based Rebalancing Kept Allocations In Line

● VT ● BND ● BTC



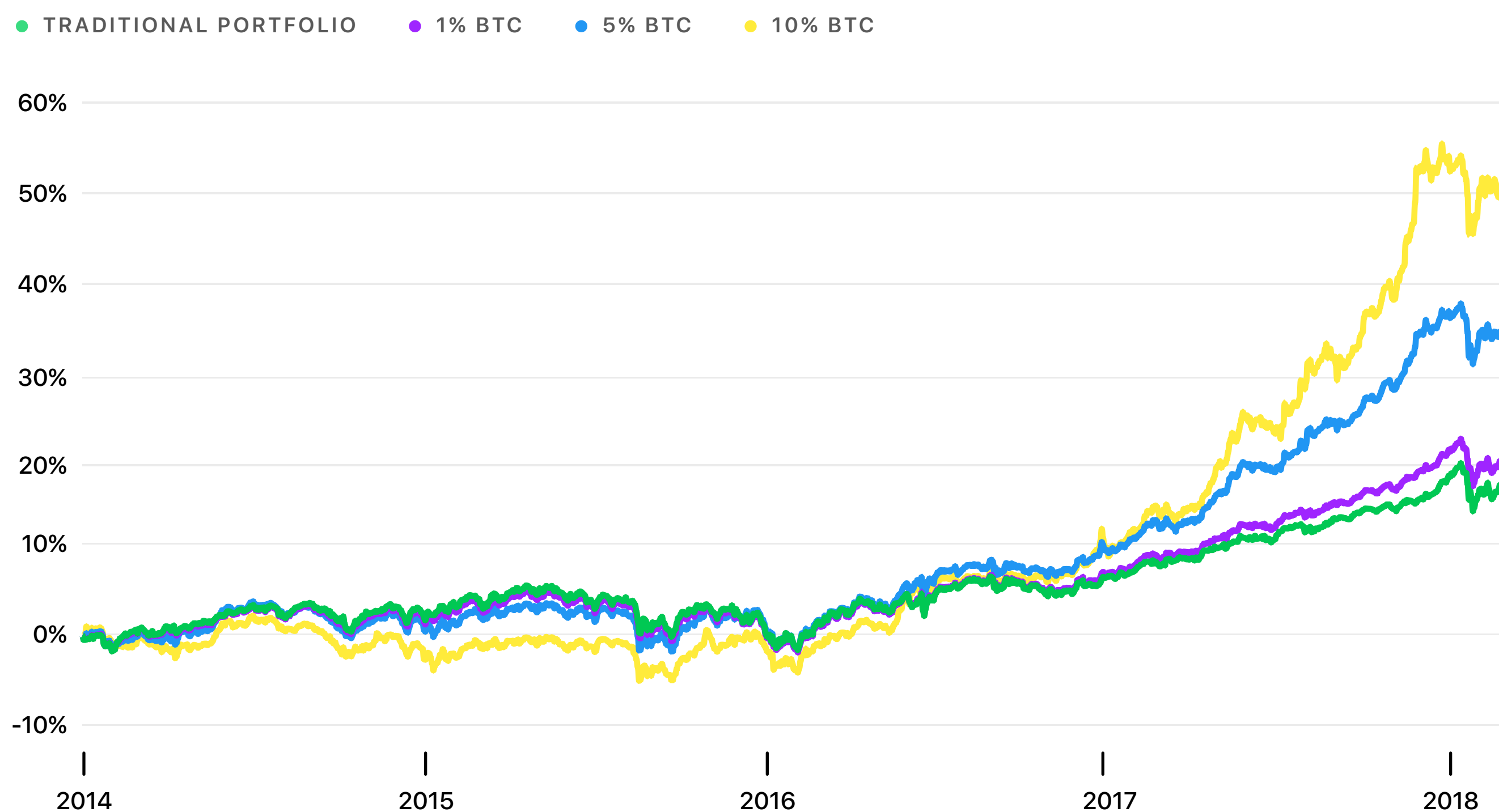
What Is The Right Size? Comparing 1%, 5% & 10% Allocations to Bitcoin

The data clearly show that allocating to Bitcoin and systematically rebalancing your portfolio makes sense. The next question becomes, how much should you allocate to the space?

To evaluate this, the study looked at two additional scenarios, using both a 1% and 10% starting allocation to Bitcoin, with the same 50% rebalancing tolerance used previously.

The result of these allocations are not surprising. Both portfolios improve upon the Traditional Portfolio, with higher returns, substantially higher Sharpe ratios, and similar or lower maximum drawdowns.

What Is the Right Allocation to Bitcoin?



It's worth paying particular attention to the 1% portfolio. In a 1% portfolio, Bitcoin never exceeds 1.5% of the total portfolio weight, an easy-to-digest allocation for conservative investors. Nonetheless, it contributes an additional 4.5% to the total return, and does so without altering the portfolio's risk: Monthly volatility rises from 6.5% to just 6.7%, while the Max Drawdown actually falls slightly. This unique combination boosts the Sharpe ratio from 0.80 to 1.02.

A little Bitcoin, it turns out, goes a long way.

Summary Statistics: How Much Bitcoin Is Enough?

	TOTAL RETURN	VOLATILITY (MONTHLY)	SHARPE RATIO	UP CAPTURE	DOWN CAPTURE	MAX DRAWDOWN
Traditional Portfolio	26.53%	6.5%	0.80	0.61	0.71	-11.37%
1% Bitcoin	31.09%	6.70%	1.02	0.69	0.69	-10.95%
5% Bitcoin	50.89%	8.30%	1.55	0.99	0.68	-9.36%
10% Bitcoin	78.38%	11.6%	1.75	1.37	0.66	-12.11%

Correlations: Observed & Theoretical

Why is Bitcoin such a valuable contributor to the portfolio? Part of it has to do with its spectacular returns; anything that rises 850% over the span of 4+ years will shine in a portfolio analysis.

But Bitcoin's ability to enhance returns without significantly increasing overall levels of risk is driven by more than just returns; it's driven by its low correlation to virtually every other asset class.

Specifically, over the course of this study, Bitcoin's monthly correlation to stocks (VT) was 0.12 and its correlation to bonds (BND) was 0.25. To put those numbers in perspective, the correlation between U.S. and international equities—a common pair that investors think about when adding diversification—was 0.88 over this time.

Although this analysis did not consider other asset classes, Bitcoin's low correlation would have extended to virtually any area of the capital markets it considered, including gold (0.07), broad-based commodities (0.09), listed private equity (-0.10), VIX futures (-0.25), and multistrategy hedge funds (0.00).

The \$1 million question is, will those low correlations persist?

There is good reason to believe the answer is "yes," as the primary long-term drivers of returns for Bitcoin and other cryptoassets are fundamentally different than they are for stocks and bonds. Cryptoassets are driven by network growth, technology improvements, regulatory developments and other crypto-specific factors, while stocks and bonds are driven by economy wide trends like corporate profits, economic growth, productivity, and interest rates.

Primary Drivers of Returns

Equity

Corporate Profits
Economic Growth
Interest Rates
Productivity

Bonds

Corporate Profits
(For Corporate Bonds)
Economic Growth
Interest Rates
Issuance

Crypto

Investor Adoption
Millennial Growth
Network Growth
Regulatory Development
Technology Development

As a risk asset, crypto prices may be influenced—even heavily influenced—by risk-on/risk-off trends, and we expect to see correlations rise during times of market distress. But over the long term, with different fundamental drivers of returns, the likelihood of crypto retaining a low correlation to traditional financial assets is high.

Conclusion

Bitcoin and other cryptoassets have attracted investor attention by promising potentially high returns with low correlations to other assets. This study suggests that allocating to Bitcoin can significantly increase a portfolio's risk-adjusted return, provided the investor takes the time to systematically rebalance their portfolio to ensure allocations stay in line with target weights.

Bitcoin and other cryptoassets can look daunting and risky in isolation, as the 65% drawdown in Bitcoin that marked the beginning of 2018 showed. But the long-term potential of the asset class and its unique correlation properties make it an interesting allocation for forward-thinking institutionally oriented managers.

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