

# Including Cryptoassets in a Diversified Portfolio

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# Introduction

When one considers investing in a given asset class and subsequently a specific asset – two primary questions should be asked:

1. What is the investment thesis for this asset class?
2. What proportion of a portfolio should be allocated to this asset class given current financial goals and constraints?

This primer will provide the answer to the second question (2). At its core, the question is optimal portfolio construction and

the risk management of said portfolio for a given set of constituents. For brevity, we will assume the reader understands basic Modern Portfolio Theory but perhaps is less familiar with cryptoasset terminology and will define and expand on concepts where deemed necessary. Our report's key argument is that adding cryptoasset exposure will lead to superior risk-adjusted investment outcomes precisely due to their unique property of having largely unrelated risk premiums compared to all other asset classes.

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<b>Correlation of Returns Across Asset Classes</b>	<b>4</b>
<hr/>	
<b>Correlation of returns during distressed times</b>	<b>4</b>
March 2020 (Covid Crash)	4
March 2023 (Banking Crisis)	5
<hr/>	
<b>Portfolio with different rebalancing frequencies</b>	<b>5</b>
5% BTC allocation to a simple growth portfolio (60% US Equity, 40% US Bond)	5
1% BTC allocation to a simple growth portfolio (60% US Equity, 40% US Bond)	6
1% ETH allocation to a simple growth portfolio (60% US Equity, 40% US Bond)	7
5% BTC, 1% ETH allocation to a simple growth portfolio (60% US Equity, 40% US Bond)	7
<hr/>	
<b>Conclusion</b>	<b>9</b>
<hr/>	
<b>Disclaimer</b>	<b>9</b>
<hr/>	

# Correlation of Returns Across Asset Classes

In Figure 1, we compare the correlation of returns for several major asset classes, represented by popular exchange-traded funds (ETFs), as well as Bitcoin (BTC) and Ether (ETH). The ETFs chosen represent a variety of asset classes and risk profiles and are as follows:

- **US Equity**, represented by SPY – The SPDR S&P 500 ETF
- **Developed Equity**, represented by EFA – The iShares MSCI EAFE ETF
- **Emerging Equity**, represented by EEM – The iShares MSCI Emerging Markets ETF
- **US Bond**, represented by AGG – The iShares Core U.S. Aggregate Bond ETF
- **US Long Term Treasury**, represented by TLT – The iShares 20+ Year Treasury Bond ETF
- **Real Estate**, VNQ – The Vanguard Real Estate ETF
- **Gold**, GLD – The SPDR Gold Shares ETF
- **ARK Innovation**, represented by ARKK

Bitcoin's correlation with major asset classes ranges from

**0.02 to 0.36 (excluding Ethereum), similar to what Gold (GLD) offers, ranging from 0.13 to 0.24 from January 1, 2019, to May 31, 2024. Similarly, Ethereum promises to be a viable diversification tool, showcased by also having a low correlation with major asset classes, ranging from -0.01 to 0.35 (excluding Bitcoin).** This low level of correlation makes both assets a vital diversification source for traditional portfolios, which are a mix of equities and bonds. However, there is almost no correlation (0.14) between gold and Bitcoin, or gold and Ethereum (0.13) making both unique diversification resources for investors' portfolios.

## Correlation of returns during distressed times March 2020 (Covid Crash)

During distressed times, asset classes tend to show an increased correlation between them. The stock market crash and liquidity crisis caused by the COVID-19 pandemic exemplify this pattern. Figure 2 shows that the significant and sudden global event that began in March 2020 and ended in April caused both Bitcoin and Ethereum to undergo a sudden rise in correlation with gold.

Figure 1: Correlation matrix

	US Equity	Developed Equity	Emerging Equity	US Bond	US LT Treasury	Real Estate	Gold	ARK Innovation	Bitcoin	Ethereum
US Equity	1.00	0.71	0.60	0.04	-0.16	0.80	0.14	0.71	0.32	0.34
Developed Equity	0.71	1.00	0.76	0.14	-0.06	0.61	0.19	0.56	0.32	0.32
Emerging Equity	0.60	0.76	1.00	0.06	-0.11	0.49	0.19	0.57	0.23	0.26
US Bond	0.04	0.14	0.06	1.00	0.89	0.17	0.24	0.16	0.07	0.05
US LT Treasury	-0.16	-0.06	-0.11	0.89	1.00	-0.01	0.17	0.03	0.02	-0.01
Real Estate	0.80	0.61	0.49	0.17	-0.01	1.00	0.20	0.55	0.26	0.28
Gold	0.14	0.19	0.19	0.24	0.17	0.20	1.00	0.14	0.14	0.13
ARK Innovation	0.71	0.56	0.57	0.16	0.03	0.55	0.14	1.00	0.36	0.35
Bitcoin	0.32	0.32	0.23	0.07	0.02	0.26	0.14	0.36	1.00	0.82
Ethereum	0.34	0.32	0.26	0.05	-0.01	0.28	0.13	0.35	0.82	1.00
<b>Average Correlation</b>	<b>0.45</b>	<b>0.45</b>	<b>0.40</b>	<b>0.28</b>	<b>0.18</b>	<b>0.44</b>	<b>0.25</b>	<b>0.44</b>	<b>0.35</b>	<b>0.35</b>

Source: 21Shares. Data from Bloomberg and Yahoo Finance (BTC and ETH). From January 1, 2019 to May 31, 2024.

Figure 2: Correlation of returns during March 2020 (Covid Crash)

	US Equity	Developed Equity	Emerging Equity	US Bond	US LT Treasury	Real Estate	Gold	ARK Innovation	Bitcoin	Ethereum
US Equity	1.00	0.71	0.68	-0.14	-0.37	0.95	0.63	0.90	0.58	0.65
Developed Equity	0.71	1.00	0.86	0.23	-0.06	0.74	0.71	0.78	0.70	0.66
Emerging Equity	0.68	0.86	1.00	0.06	-0.25	0.75	0.61	0.70	0.48	0.48
US Bond	-0.14	0.23	0.06	1.00	0.88	-0.05	0.24	0.01	0.05	0.02
US LT Treasury	-0.37	-0.06	-0.25	0.88	1.00	-0.29	0.06	-0.15	-0.01	-0.06
Real Estate	0.95	0.74	0.75	-0.05	-0.29	1.00	0.66	0.90	0.53	0.58
Gold	0.63	0.71	0.61	0.24	0.06	0.66	1.00	0.70	0.55	0.55
ARK Innovation	0.90	0.78	0.70	0.01	-0.15	0.90	0.70	1.00	0.69	0.69
Bitcoin	0.58	0.70	0.48	0.05	-0.01	0.53	0.55	0.69	1.00	0.97
Ethereum	0.65	0.66	0.48	0.02	-0.06	0.58	0.55	0.69	0.97	1.00
<b>Average Correlation</b>	<b>0.56</b>	<b>0.63</b>	<b>0.54</b>	<b>0.23</b>	<b>0.08</b>	<b>0.58</b>	<b>0.57</b>	<b>0.62</b>	<b>0.55</b>	<b>0.55</b>

Source: 21Shares. Data from Bloomberg and Yahoo Finance (BTC and ETH)

## March 2023 (Banking Crisis)

Bitcoin and Ethereum rallied 23% and 25% respectively in March 2023, on the back of a looming banking crisis in the U.S. On March 13, the Federal Reserve had to step in to protect all depositors of Silicon Valley Bank, which experienced a bank run two days before, and of crypto-friendly Signature Bank, controversially shut down by its state chartering authority. Then, on March 19, UBS agreed to buy Credit Suisse in an emergency rescue deal brokered by Swiss authorities. Meanwhile, Figure 3 shows that BTC and ETH decoupled from risk assets like stocks and showed an **increased correlation to Gold** as investors turned to it as a hedge against bank risk.

At its core, Bitcoin is a non-sovereign and global asset that exhibits unique characteristics (trustless, permissionless, and censorship-resistant, among others). Indeed, one of Satoshi Nakamoto's primary motivations for creating Bitcoin was to have an alternative payment system outside central banks' control.

## Portfolio with different rebalancing frequencies

We choose a traditional 60/40 portfolio (60% allocated to stocks, 40% allocated to bonds) as the hypothetical benchmark, as it has been a guidepost for the average investor since Nobel laureate Harry Markowitz developed the principles of Modern Portfolio Theory (MPT) in the 1950s. For brevity, we assume the reader has a good understanding of MPT. Then, we backtest Bitcoin and/or Ether allocations to said diversified portfolio to understand the impact of a minor allocation to crypto across various performance metrics. Before diving into the results, the reader should be aware that this hypothetical portfolio was developed in hindsight, and past performance is no guarantee of future results.

## 5% BTC allocation to a simple growth portfolio (60% US Equity, 40% US Bond)

We tested six types of rebalancing strategies by adding 5% constant BTC allocation to a simple growth portfolio (US Eq-

Figure 3: Correlation of returns during March 2023 (Banking Crisis)

	US Equity	Developed Equity	Emerging Equity	US Bond	US LT Treasury	Real Estate	Gold	ARK Innovation	Bitcoin	Ethereum
US Equity	1.00	0.70	0.47	-0.44	-0.40	0.82	-0.24	0.81	0.08	0.05
Developed Equity	0.70	1.00	0.60	-0.51	-0.48	0.42	-0.33	0.38	-0.04	-0.03
Emerging Equity	0.47	0.60	1.00	-0.23	-0.22	0.27	0.15	0.27	0.30	0.41
US Bond	-0.44	-0.51	-0.23	1.00	0.92	-0.29	0.60	-0.19	0.08	0.05
US LT Treasury	-0.40	-0.48	-0.22	0.92	1.00	-0.28	0.49	-0.18	-0.11	-0.10
Real Estate	0.82	0.42	0.27	-0.29	-0.28	1.00	-0.07	0.73	0.16	0.09
Gold	-0.24	-0.33	0.15	0.60	0.49	-0.07	1.00	-0.15	0.52	0.49
ARK Innovation	0.81	0.38	0.27	-0.19	-0.18	0.73	-0.15	1.00	0.31	0.30
Bitcoin	0.08	-0.04	0.30	0.08	-0.11	0.16	0.52	0.31	1.00	0.94
Ethereum	0.05	-0.03	0.41	0.05	-0.10	0.09	0.49	0.30	0.94	1.00
<b>Average Correlation</b>	<b>0.28</b>	<b>0.17</b>	<b>0.30</b>	<b>0.10</b>	<b>0.06</b>	<b>0.28</b>	<b>0.24</b>	<b>0.33</b>	<b>0.32</b>	<b>0.32</b>

\*Color description:  
Yellow color means higher correlation among assets, grey color means lower or negative correlation among assets

Source: 21Shares. Data from Bloomberg and Yahoo Finance (BTC and ETH)

Figure 4: Growth portfolio with different rebalancing frequencies (5% BTC allocation)

Performance	Benchmark 60 Equity (SPY) 40 Bond (AGG) Monthly rebalance No BTC	Daily Rebalance 5% BTC	Weekly Rebalance 5% BTC	Monthly Rebalance 5% BTC	Quarterly Rebalance 5% BTC	Annual Rebalance 5% BTC	No Rebalance 5% BTC
Start Date	January 1, 2019	January 1, 2019	January 1, 2019	January 1, 2019	January 1, 2019	January 1, 2019	January 1, 2019
End Date	May 31, 2024	May 31, 2024	May 31, 2024	May 31, 2024	May 31, 2024	May 31, 2024	May 31, 2024
Cumulative Return	68.62%	102.91%	102.36%	102.03%	115.81%	111.33%	118.98%
Annualized Return	10.14%	13.97%	13.91%	13.88%	15.28%	14.83%	15.59%
Annualized Volatility	12.81%	13.80%	13.72%	13.69%	13.76%	13.92%	16.60%
Sharpe Ratio	0.69	0.90	0.90	0.90	0.98	0.94	0.86
Sortino Ratio	0.87	1.16	1.16	1.16	1.28	1.23	1.12
Information Ratio		0.07	0.07	0.07	0.08	0.06	0.04
Tracking Error (Ann.)	0.00%	3.20%	3.20%	3.31%	3.86%	4.85%	8.12%
var_95_monthly	-5.35%	-6.62%	-6.63%	-6.66%	-6.41%	-6.47%	-7.19%
var_95_annual	-11.62%	-13.25%	-13.36%	-13.40%	-13.23%	-13.19%	-16.65%
1Y Cumulative Rolling Hit	0.00%	99.65%	99.54%	99.56%	99.50%	99.50%	99.54%
3Y Cumulative Rolling Hit	0.00%	99.79%	99.72%	99.73%	99.69%	99.69%	99.72%
Max Drawdown	-21.63%	-23.14%	-23.26%	-23.34%	-23.49%	-24.22%	-32.45%
Max Relative Drawdown	0.00%	-1.51%	-1.63%	-1.71%	-1.86%	-2.59%	-10.82%
1Y	15.65%	20.91%	20.86%	21.04%	21.46%	22.70%	34.21%
3Y	13.29%	19.56%	19.40%	19.04%	19.86%	21.63%	28.38%
5Y	55.54%	79.71%	79.40%	77.84%	88.61%	84.85%	96.68%
alpha (vs SPY)	0.00	3.15	52.13	-1.89	8.73	-1.12	11.21
beta (vs SPY)	1.00	-0.02	-0.90	0.01	0.00	0.00	0.00

Source: 21Shares. Data from Yahoo Finance



uity – 60% represented by SPY, US Bond – 40% represented by AGG): daily, weekly, monthly, quarterly, annually, and no rebalancing. These are the key takeaways:

- **Improved risk-adjusted returns:** The inclusion of cryptoassets in the diversified portfolio is noticeable with improved overall performance across all rebalance frequencies, improving annualized return by around 3 to 5% (from 13.88% to 15.59%) and enhancing Sharpe ratio from 0.69 to a range of 0.86 - 0.98
- **Rebalancing is key:** However, when adding Bitcoin without rebalancing, overall risk suffers with 16.60% annualized volatility, higher than other strategies and the benchmark of 12.81%. **The most risk-efficient rebalancing schedule is annual.** This strategy has historically proven to still provide outstanding cumulative returns (115.81%) while maximizing Sharpe (0.98) and Sortino (1.28) ratios.
- **Timing doesn't really matter:** As investors argue that timing matters in crypto investments, the research showed regardless of when to add Bitcoin to their portfolio, almost 100% of the time, the strategy exceeded the benchmark in the next

year and in the next 3 years. This figure tends to increase over time.

**1% BTC allocation to a simple growth portfolio (60% US Equity, 40% US Bond)**

We also tested six types of rebalancing strategies by adding just 1% constant bitcoin allocation to a simple growth portfolio (US Equity – 60%, US Bond – 40%): daily, weekly, monthly, quarterly, annually, and no rebalancing (see next slide). These are the key takeaways:

- **Improved risk-adjusted returns:** The inclusion of Bitcoin in the diversified portfolio is noticeable, with improved overall performance across all rebalance frequencies, improving annualized return by around 1 to 2% (from 10.89% to 11.87%) and enhancing the Sharpe ratio from 0.69 to a range of 0.74 - 0.77.
- **Rebalancing is key:** However, when adding Bitcoin without rebalancing, overall risk suffers with 13.83% annualized volatility, higher than the benchmark of 12.81%. **The most risk-efficient rebalancing schedule is quarterly.** This strategy has historically proven to still provide outstanding cumulative

returns (74.92%) while maximizing Sharpe (0.77) and Sortino (0.98) ratios.

- **Timing doesn't really matter:** As investors argue that timing matters in crypto investments, the research showed regardless of when to add Bitcoin to their portfolio, almost 100% of the time, the strategy exceeded the benchmark in the next year and in the next 3 years. This figure tends to increase over time.

**1% ETH allocation to a simple growth portfolio (60% US Equity, 40% US Bond)**

In addition, we tested six types of rebalancing strategies by adding 1% constant ETH allocation to a simple growth portfolio (US Equity – 60%, US Bond – 40%): daily, weekly, monthly, quarterly, annually, and no rebalancing (see next slide). These are the key takeaways:

- **Improved risk-adjusted returns:** The inclusion of Ethereum in the diversified portfolio is noticeable, with improved overall performance across all rebalance frequencies, improving annualized return by around 1% (from 11.11% to 11.74%) and

enhancing the Sharpe ratio from 0.69 to a range of 0.74 - 0.79.

- **Rebalancing is key:** However, when adding Ethereum without rebalancing, overall risk suffers with 13.87% annualized volatility, higher than the benchmark of 12.81%. **The most risk-efficient rebalancing schedule is annually.** This strategy has historically proven to maximize cumulative returns (82.33%) and Sharpe (0.79) and Sortino (1.01) ratios.

- **Timing doesn't really matter:** As investors argue that timing matters in crypto investments, the research showed regardless of when to add Bitcoin to their portfolio, almost 100% of the time, the strategy exceeded the benchmark in the next year and in the next 3 years. This figure tends to increase over time.

**5% BTC 1% ETH allocation to a simple growth portfolio (60% US Equity, 40% US Bond)**

Finally, we tested six types of rebalancing strategies by adding 5% constant BTC and 1% constant ETH allocation to a simple growth portfolio (US Equity – 60%, US Bond – 40%): daily, weekly, monthly, quarterly, annually, and no rebalancing (see

Figure 5: Growth portfolio with different rebalancing frequencies (1% BTC allocation)

Performance	Benchmark 60 Equity (SPY) 40 Bond (AGG) Monthly rebalance No BTC	Daily Rebalance 1% BTC	Weekly Rebalance 1% BTC	Monthly Rebalance 1% BTC	Quarterly Rebalance 1% BTC	Annual Rebalance 1% BTC	No Rebalance 1% BTC
Start Date	January 1, 2019	January 1, 2019	January 1, 2019	January 1, 2019	January 1, 2019	January 1, 2019	January 1, 2019
End Date	May 31, 2024	May 31, 2024	May 31, 2024	May 31, 2024	May 31, 2024	May 31, 2024	May 31, 2024
Cumulative Return	68.62%	76.43%	75.56%	74.92%	78.20%	77.05%	83.44%
Annualized Return	10.14%	11.06%	10.96%	10.89%	11.27%	11.13%	11.87%
Annualized Volatility	12.81%	13.04%	12.99%	12.92%	12.84%	12.74%	13.83%
Sharpe Ratio	0.69	0.74	0.74	0.74	0.77	0.76	0.76
Sortino Ratio	0.87	0.95	0.94	0.94	0.98	0.97	0.97
Information Ratio		0.07	0.07	0.07	0.08	0.05	0.03
Tracking Error (Ann.)	0%	1%	1%	1%	1%	1%	2%
var_95_monthly	-5.35%	-5.66%	-5.62%	-5.64%	-5.48%	-5.51%	-6.78%
var_95_annual	-11.62%	-11.82%	-11.90%	-11.98%	-12.01%	-12.10%	-12.99%
1Y Cumulative Rolling Hit	0.00%	99.65%	99.54%	99.56%	99.50%	99.50%	99.54%
3Y Cumulative Rolling Hit	0.00%	99.79%	99.72%	99.73%	99.69%	99.69%	99.72%
Max Drawdown	-21.63%	-21.80%	-21.97%	-21.78%	-21.23%	-21.35%	-23.44%
Max Relative Drawdown	0.00%	-0.17%	-0.34%	-0.15%	0.00%	0.28%	-1.81%
1Y	15.65%	16.67%	16.64%	16.72%	16.89%	17.35%	22.09%
3Y	13.29%	14.87%	14.68%	14.44%	14.61%	15.43%	19.70%
5Y	55.54%	61.52%	60.78%	59.84%	62.63%	61.73%	68.69%
alpha (vs SPY)	0.00	-1.00	-1.01	0.81	-1.30	-1.10	-0.40
beta (vs SPY)	1.00	-0.02	0.05	0.02	0.00	0.00	0.01

Source: 21Shares. Data from Yahoo Finance

Figure 6: Growth portfolio with different rebalancing frequencies (1% ETH allocation)

Performance	Benchmark 60 Equity (SPY) 40 Bond (AGG) Monthly rebalance No BTC	Daily Rebalance 1% ETH	Weekly Rebalance 1% ETH	Monthly Rebalance 1% ETH	Quarterly Rebalance 1% ETH	Annual Rebalance 1% ETH	No Rebalance 1% ETH
Start Date	January 1, 2019	January 1, 2019	January 1, 2019	January 1, 2019	January 1, 2019	January 1, 2019	January 1, 2019
End Date	May 31, 2024	May 31, 2024	May 31, 2024	May 31, 2024	May 31, 2024	May 31, 2024	May 31, 2024
Cumulative Return	68.62%	78.44%	77.53%	76.86%	78.48%	82.33%	81.23%
Annualized Return	10.14%	11.30%	11.19%	11.11%	11.30%	11.74%	11.62%
Annualized Volatility	12.81%	13.12%	13.06%	13.00%	12.97%	12.98%	13.87%
Sharpe Ratio	0.69	0.75	0.75	0.75	0.76	0.79	0.74
Sortino Ratio	0.87	0.97	0.96	0.95	0.97	1.01	0.95
Information Ratio		0.07	0.07	0.07	0.06	0.05	0.03
Tracking Error (Ann.)	0%	1%	1%	1%	1%	2%	2%
var_95_monthly	-5.35%	-5.74%	-5.71%	-5.70%	-5.50%	-5.51%	-6.83%
var_95_annual	-11.62%	-11.78%	-11.84%	-11.90%	-11.95%	-12.13%	-13.25%
1Y Cumulative Rolling Hit	0.00%	99.79%	99.77%	99.77%	99.36%	95.42%	95.69%
3Y Cumulative Rolling Hit	0.00%	99.87%	99.86%	99.86%	99.61%	97.07%	97.15%
Max Drawdown	-21.63%	-21.96%	-22.15%	-21.96%	-21.56%	-21.62%	-23.69%
Max Relative Drawdown	0.00%	-0.32%	-0.52%	-0.33%	0.00%	0.00%	-2.06%
1Y	15.65%	16.44%	16.40%	16.43%	16.54%	16.83%	20.61%
3Y	13.29%	14.91%	14.71%	14.45%	14.42%	15.90%	18.38%
5Y	55.54%	63.50%	62.64%	61.75%	63.26%	66.99%	67.28%
alpha (vs SPY)	0.00	-1.98	-0.32	-0.61	-0.88	5.16	-3.06
beta (vs SPY)	1.00	0.01	0.04	0.01	0.00	0.01	0.01

Source: 21Shares. Data from Yahoo Finance

next slide). Traditional investors are often concerned about the classification of their crypto asset allocations. While Bitcoin is often considered digital gold and may be classified under commodities, Ethereum presents a unique case. As a platform that fuels innovation and powers the next generation of the internet, Ethereum aligns more closely with technology investments. Consequently, it should be regarded alongside other technology equities, reflecting its role as a cornerstone of modern technological infrastructure. These are the key takeaways:

- **Improved risk-adjusted returns:** The inclusion of Bitcoin and Ethereum in the diversified portfolio is noticeable, with improved overall performance across all rebalance frequencies, improving annualized return by around 4 to 6% (from 14.86%

to 16.33%) and enhancing the Sharpe ratio from 0.69 to a range of 0.94 – 1.02.

- **Rebalancing is key:** However, when adding Bitcoin and Ethereum without rebalancing, overall risk suffers with 17.33% annualized volatility, higher than the benchmark of 12.81%. **The most risk-efficient rebalancing schedule is quarterly.** This strategy has historically proven to still provide outstanding cumulative returns (126.52%) while maximizing Sharpe (1.02) and Sortino (1.33) ratios.
- **Timing doesn't really matter:** As investors argue that timing matters in crypto investments, the research showed regardless of when to add Bitcoin and Ethereum to their portfolio, almost 100% of the time, the strategy exceeded the benchmark in the next year and in the next 3 years. This figure tends to increase over time.

# Conclusion

This report has demonstrated the benefits of allocating a portion of one's portfolio to Bitcoin and Ethereum through a thorough backtest over history. The core reason is historical evidence that cryptoassets give investors a chance to diversify their portfolios further and maximize risk-adjusted returns. The unique dynamics of the cryptoasset industry ensure that the critical value drivers for Bitcoin or Ethereum bear little relationship to the value drivers of stocks, fixed incomes, or alternative investments. What makes cryptoasset investing considerable is its potential

to improve the risk profile by magnitudes. The often-volatile risk profiles of cryptoassets must be judged as just one part of an investor's whole portfolio. Rebalancing is needed to harvest the risk premium and maintain the portfolio's risk profile without significant downside risk exposure during distress periods.

However, theoretical portfolio allocation is only one aspect of the investment process one must go through before investing; this report has purposely avoided associated topics such as valuation, as these are covered in other writings.

Figure 7: Growth portfolio with different rebalancing frequencies (5% BTC & 1% ETH allocation)

Performance	Benchmark 60 Equity (SPY) 40 Bond (AGG) Monthly rebalance No BTC	Daily Rebalance 5% BTC & 1% ETH	Weekly Rebalance 5% BTC & 1% ETH	Monthly Rebalance 5% BTC & 1% ETH	Quarterly Rebalance 5% BTC & 1% ETH	Annual Rebalance 5% BTC & 1% ETH	No Rebalance 5% BTC & 1% ETH
Start Date	January 1, 2019	January 1, 2019	January 1, 2019	January 1, 2019	January 1, 2019	January 1, 2019	January 1, 2019
End Date	May 31, 2024	May 31, 2024	May 31, 2024	May 31, 2024	May 31, 2024	May 31, 2024	May 31, 2024
Cumulative Return	68.62%	112.41%	111.90%	111.63%	126.52%	126.68%	125.95%
Annualized Return	10.14%	14.94%	14.89%	14.86%	16.31%	16.33%	16.26%
Annualized Volatility	12.81%	14.13%	14.04%	14.02%	14.19%	14.60%	17.33%
Sharpe Ratio	0.69	0.94	0.94	0.94	1.02	1.00	0.86
Sortino Ratio	0.87	1.22	1.22	1.22	1.33	1.30	1.13
Information Ratio		0.07	0.07	0.07	0.08	0.06	0.04
Tracking Error (Ann.)	0%	4%	4%	4%	5%	6%	9%
var_95_monthly	-5.35%	-6.71%	-6.73%	-6.77%	-6.67%	-6.72%	-7.36%
var_95_annual	-11.62%	-13.56%	-13.67%	-13.68%	-13.48%	-13.49%	-17.65%
1Y Cumulative Rolling Hit	0.00%	99.66%	99.57%	99.61%	99.47%	99.47%	99.56%
3Y Cumulative Rolling Hit	0.00%	99.80%	99.74%	99.76%	99.68%	99.68%	99.73%
Max Drawdown	-21.63%	-23.77%	-23.90%	-23.91%	-24.09%	-25.53%	-34.22%
Max Relative Drawdown	0.00%	-2.14%	-2.27%	-2.28%	-2.46%	-3.90%	-12.59%
1Y	15.65%	21.75%	21.68%	21.84%	22.24%	23.53%	35.69%
3Y	13.29%	20.78%	20.61%	20.20%	20.98%	23.65%	29.18%
5Y	55.54%	86.73%	86.42%	84.74%	96.33%	96.67%	102.47%
alpha (vs SPY)	0.00	-3.47	1.33	1.98	-0.84	-1.46	-0.94
beta (vs SPY)	1.00	0.02	0.00	-0.04	0.00	0.00	0.00

Source: 21Shares. Data from Yahoo Finance

# Disclosure

The hypothetical backtested examples herein are provided as illustrative examples only and do not represent the performance of actual client portfolios managed by 21Shares. It is unlikely an account will achieve profits or losses similar to those discussed. There are frequently sharp differences between hypothetical backtested performance results and the actual performance results subsequently achieved by any particular trading program.

Hypothetical performance results have many inherent limitations, some of which are described below. No representation is being made that any account will or is likely to achieve profits or losses similar to those shown. In fact, there are frequently sharp differences between hypothetical performance results and the actual results subsequently achieved by any particular trading program.

One of the limitations of hypothetical performance results is that they are generally prepared with the benefit of hindsight. In addition, hypothetical trading does not involve financial risk, and no hypothetical trading record can completely account for the impact of financial risk in actual trading. For example, the ability to withstand losses or adhere to a particular trading program in spite of trading losses are material points which can also adversely affect actual trading results. There are numerous other factors related to the markets in general or to the implementation of any specific trading program which cannot be fully accounted for in the preparation of hypothetical performance results and all of which can adversely affect actual trading results.

The hypothetical backtested performance which informs our expectations is calculated based on historical market data over the date ranges identified in the Figures above and is based on the following assumptions:

- The investable universe for the backtest includes SPY (U.S. Equity), URG (MSCI World), AGG (U.S. Bond), as well as BTC and ETH.
- The backtest portfolios don't employ leverage.
- The model rebalances across different frequencies (daily, weekly, monthly, quarterly, annual, and no rebalance).
- Performance was calculated using assumptions that all rebalanced model trades executed using the close price of the asset, and the model is priced daily using the closing market price for each asset. Brokerage expenses are not included in the performance numbers.
- The performance shown is for the stated time period only.
- The returns shown assume the reinvestment of dividends and other income.
- The returns shown do not consider any fees, such as the deduction of management fees and other brokerage expenses that may be incurred in managing an investment account.
- The returns do not take into account slippage which would have incurred when actual investments are made.

There are numerous other factors related to the markets in general or to the implementation of any specific trading program which cannot be fully accounted for in the preparation of hypothetical backtested performance results and all of which can adversely affect actual trading results.

Our expected returns and expected volatility measures have been based on 21Shares' backtesting analysis. For the reasons noted above, actual returns would have varied, potentially greatly, from any returns or volatility measures a client would have experienced.

No assurance can be given that the investment objective or target return will be achieved or that an investor will receive a return of all or part of his or her initial investment.

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