

## 2.7 How 1 percent bitcoin could optimize the risk reward on a diversified portfolio



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## How 1% of Bitcoin could optimize the risk/reward on a diversified portfolio?

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**Abstract.** Crypto asset landscape has matured into a powerful force that traditional finance can no longer afford to ignore. The crypto ecosystem is a new frontier for capital and a source of opportunity. This shift is driven by a confluence of factors, including growing institutional interest, increasing regulatory clarity, and the promise of a more efficient and transparent financial infrastructure. According to the literature in asset management, crypto asset are liquid alternative investments which tend to be non-correlated with stocks and bonds. The aim of this papers is to demonstrate that a crypto allocation in a diversified traditional portfolios will improve the portfolio in variety of metrics. Overall, adding 1% of BTC in a diversified portfolio has provided a downside protection and/or enhanced returns.

### KEY WORDS

Portfolio allocation, Asset diversification, Risk/reward optimization, Alternative assets

## 1. Introduction

A significant and profound transformation of the global financial landscape has been observed, with crypto assets having emerged as a potent and undeniable force. The crypto ecosystem has evolved from a mere object of passing curiosity to a significant frontier for the deployment of capital and a compelling source of opportunity. The traditional finance can no longer disregard this development. This paradigm shift has been propelled by a complex confluence of factors, which include augmented institutional interest, a developing regulatory clarity and the fundamental promise of a more efficient and transparent financial infrastructure underpinned by blockchain technology. In the context of established asset management, Bitcoin have come to be regarded as a distinct and consequential class of liquid alternative investments. A substantial body of extant academic and financial literature consistently posits that these assets tend to exhibit a low correlation with conventional asset classes, such as equities and fixed-income instruments, thereby presenting a unique value proposition for diversification. The principal objective of this paper is to demonstrate that a strategic, allocation of Bitcoin within a traditional, diversified portfolio can yield a notable enhancement across a variety of key performance metrics.

## 2. Portfolio management and diversification

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Portfolio management can be defined as the practice and theory of selecting, constructing, and continuously overseeing a basket of investment holdings with the aim of satisfying specific financial objectives. A fundamental principle of this discipline is diversification, a strategy meticulously designed to effectuate a reduction of non-systemic risk by allocating capital across various asset classes that do not demonstrate perfect covariance. The overarching objective of this methodology is to achieve an improvement of the risk-adjusted performance of the portfolio, as a depreciation in the value of one asset class may be counterbalanced by a positive performance in another. Historically, traditional investment portfolios have been constructed from a combination of assets, including equities and fixed-income instruments. Historically, equities have offered the potential for substantial growth, albeit at the cost of higher volatility. By contrast, fixed-income instruments have provided a measure of stability and recurring income. The efficacy of this conventional methodology is contingent upon the non-correlation between these two asset classes. However, within an increasingly interconnected and globally integrated market, the correlations of traditional assets have the potential to appreciate during periods of market stress. Consequently, the pursuit of genuinely non-correlated assets is a ceaseless and paramount undertaking for all discerning asset managers. This phenomenon, colloquially termed a 'flight to safety', frequently precipitates a collective movement of prices, thereby subverting the very purpose of traditional diversification.

The assessment of portfolio performance is measured alongside various key metrics, such as average daily log-return, daily volatility and Sharpe ratio. The combination of these three indicators serves to ensure the objectivity of the conclusions drawn. The mean of the natural logarithm of the ratio of the portfolio price to the price of the previous day is computed to calculate the average of daily log-return. The daily volatility is calculated as the standard deviation of daily log returns. The Sharpe ratio is defined as the excess return of the portfolio (i.e. the average log returns minus the risk-free rate) divided by its volatility.

In this research, the traditional portfolio under consideration is composed of 30% US equity, 30% international equity, and 40% fixed-income instruments. This allocation has demonstrated its resilience and efficacy in the past, despite the absence of liquid alternative investments. In order to optimise the risk-adjusted performance of this portfolio, 1% of Bitcoin is added, leading to the following allocation: The composition of the adjusted portfolio is as follows: 29.7% US equity, 29.7% international equity, 39.6% fixed-income instruments, and 1% Bitcoin.

### **3. The new role of Bitcoin in portfolio management**

The emergence of crypto assets has given rise to a novel opportunity for the contemporary practice of portfolio diversification as Bitcoin and traditional assets react differently to macroeconomic events. Lin et al. (2025)<sup>4</sup> have shown that the value of Bitcoin is largely dependent on the Producer Price Index (PPI), the US dollar exchange rate, and the yield on government bonds. This distinctive attribute is widely regarded as a principal catalyst for their non-correlated behaviour in relation to conventional equities and fixed-income instruments. Bitcoin represents a novel investment instrument for portfolio managers seeking to enhance their diversification strategy, offering a liquid alternative investment option. The integration of a judicious strategic allocation into a conventional portfolio can facilitate the realisation of the high growth potential inherent in the crypto market, while concurrently benefitting from its low correlation to other assets. The incorporation of a non-correlated asset, no matter how minor, has been demonstrated to engender a more robust and resilient portfolio structure.

### **4. Result and discussion**

A rigorous examination of the impact of a crypto allocation was undertaken by means of an analysis performed over the period from 1 January 2019 to 15 October 2025. The present investigation pertains to a diversified traditional portfolio, as outlined in Section 2. The impact of incorporating a 1% allocation of Bitcoin (BTC) into the aforementioned portfolio was subsequently analysed through the utilisation of three distinct metrics. The findings of this analysis are of particular significance due to their impact on the portfolio's performance.

Firstly, the analysis of the average daily log-return yielded a positive effect for every year. This finding lends further credence to the hypothesis that the 1% BTC allocation exerted a net positive influence on the portfolio's total returns. In summary, from 2019 to 2025, the addition of 1% of BTC to a diversified portfolio consistently afforded a

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<sup>4</sup> Lin, M., Liu, Y., & Sheng, V. N. K. (2025). Analysis of the impact of macroeconomic factors on cryptocurrency returns—Based on quantile regression study. *International Review of Economics & Finance*, 97

measure of downside protection and/or enhanced returns. Furthermore, with the increasing availability of regulated investment vehicles, such as spot ETFs, institutional actors are now able to gain exposure to these assets while adhering to best-in-class standards and ensuring a higher degree of compliance and security.

Average daily log-return	Portfolio	Portfolio with 1% BTC	Variation
2019	0,066%	0,068%	2,97%
2020	0,046%	0,051%	11,05%
2021	0,047%	0,048%	2,98%
2022	-0,067%	-0,071%	5,06%
2023	0,056%	0,060%	5,59%
2024	0,046%	0,049%	5,88%
2025	0,055%	0,055%	0,56%

Table 1: Overview of average daily log-return from 1 January 2019 to 15 October 2025

Secondly, the introduction of 1% of BTC has contributed to a moderate increase of the portfolio's volatility. Except in 2019, the incorporation of Bitcoin as a low correlated asset resulted in a slight increase of the overall risk profile of the portfolio.

Daily volatility	Portfolio	Portfolio with 1% BTC	Variation
2019	0,389%	0,383%	-1,52%
2020	1,166%	1,179%	1,11%
2021	0,462%	0,473%	2,32%
2022	0,895%	0,910%	1,69%
2023	0,487%	0,488%	0,27%
2024	0,465%	0,473%	1,69%
2025	0,667%	0,671%	0,56%

Table 2: Overview of daily volatility from 1 January 2019 to 15 October 2025

Finally, the impact upon the Sharpe ratio, a critical metric for the evaluation of risk-adjusted returns, was very positive. The Sharpe ratio exhibited a favourable outcome during the observation period, but it remains low in 2025. In that particular year, the little impact was minimal in absolute terms, suggesting that the overall long-term trend was favourable. This outcome demonstrates that the small BTC allocation was not only an element in the reduction of risk but also a contributor to superior returns on a risk-adjusted basis, thereby illustrating a more efficient allocation of capital.

Sharpe ratio	Portfolio	Portfolio with 1% BTC	Variation
2019	16,65%	17,42%	4,62%
2020	3,79%	4,18%	10,19%
2021	9,00%	9,09%	1,00%
2022	-9,31%	-9,53%	2,36%
2023	8,43%	9,06%	7,39%
2024	6,16%	6,63%	7,65%
2025	6,05%	6,06%	0,20%

Table 3: Overview of Sharpe ratio from 1 January 2019 to 15 October 2025

In term of portfolio performance, it confirms the outcome of average daily log-return. Here is a overview of Year-Over-Year hypothetical portfolio prices with a starting price of 100 as of 1 January 2019. The portfolio with 1% of Bitcoin is outperforming the traditional one.

YoY performance	Prices		YoY performance		Variation
	Portfolio	Portfolio with 1% BTC	Portfolio	Portfolio with 1% BTC	
30/12/2019	118,0	118,6			
30/12/2020	132,3	134,7	12,10%	13,53%	11,80%
31/12/2020	132,6	135,0	0,26%	0,26%	0,09%
31/12/2021	149,2	152,4	12,47%	12,86%	3,17%
30/12/2022	126,0	127,6	-15,55%	-16,26%	4,62%
29/12/2023	145,1	148,1	15,15%	16,06%	6,02%
31/12/2024	162,9	167,5	12,32%	13,09%	6,25%
15/10/2025	181,5	186,7	11,41%	11,48%	0,59%

Table 4: Overview of Year-Over-Year performance from 1 January 2019 to 15 October 2025

## 5. Conclusion

The powerful diversification benefits of a small BTC allocation stem from its unique market dynamics. In contrast to traditional assets, which exhibit synchronised declines during periods of economic uncertainty, Bitcoin's decentralised nature and its unique value proposition enable it to be influenced by a distinct set of catalysts, such as network development, adoption rates, and supply-side economics (e.g., the halving cycle). This trajectory indicates a future in which asset managers will not merely consider, but will actively integrate, a minimal allocation of digital assets into their standard portfolio offerings. Despite minor fluctuations, the long-term trend remains overwhelmingly positive, providing a compelling case for its permanent inclusion.

The findings of this paper proffer substantive evidence that Bitcoin is no longer a speculative asset class but a valuable and rational instrument for modern asset management. The analysis conducted from 2019 to 2025 demonstrates that even a minimal 1% allocation of BTC within a traditionally diversified portfolio is capable of effectuating a substantial enhancement of its performance. The persistent increase of daily log-return, alongside the overall beneficial impact on the Sharpe ratio, underscores the substantial diversification advantages. Bitcoin offer a non-correlated source of potential returns, making them of considerable relevance to asset managers who are committed to improving their portfolios' risk-adjusted performance. In the forthcoming years, there is expected to be an expansion in the range of regulated investment vehicles and infrastructure, with the integration of digital assets into mainstream investment strategies becoming a standard and indispensable practice for those seeking to construct more robust and efficient portfolios. In fact, we are already beginning to observe this shift and have institutional investor putting this in practice. For instance, Luxembourg became the first eurozone government to invest 1% of its sovereign fund in Bitcoin as part of a new investment policy for 2026 budget.

The fundamental question that confronts contemporary portfolio managers is no longer one of allocating to Bitcoin in principle, but rather, the extent to which this class of assets can be incorporated into investment portfolios, given their demonstrable capacity to engender more robust, efficient, and resilient investment strategies over the long term.