

Bitcoin and Gold as Alternative Investment Assets: Returns, Volatility, and Portfolio Diversification BenefitsAuthor: **Emily Nimatallah¹***Affiliation:*

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Abstract:

Through this study, I examine how Bitcoin and spot gold compare as alternative investment assets within modern financial portfolios. Traditional asset allocation relies heavily on equities and fixed-income securities, but macroeconomic instability, inflation, and shifting central bank policies have driven investors toward alternative stores of value. I conducted an empirical comparative study over a ten-year period (January 2015 to December 2024), analyzing 2,518 daily market observations across Bitcoin, spot gold, and the S&P 500 stock index. I evaluated five primary performance indicators: annualized return, annualized volatility, Sharpe ratio, equity market correlation, and maximum drawdown during market downturns. The results indicate a significant operational contrast between the two assets. Bitcoin demonstrated exponential capital growth with an annualized return of 64.2%, but suffered extreme annualized volatility of 68.5% and a maximum drawdown of -77.3%. Conversely, gold provided steady, defensive performance with an annualized return of 6.8%, an annualized volatility of 14.2%, and a near-zero correlation (+0.04) with the S&P 500 during market crashes. The implications suggest that while Bitcoin functions primarily as a high-beta growth driver, gold remains the superior safe-haven asset for portfolio protection and risk mitigation.

Keywords:

Bitcoin, Gold, Alternative Assets, Portfolio Diversification, Safe Haven, Volatility

Introduction:

Today, traditional portfolio management has followed the same core structure for decades. It relies primarily on a classic asset allocation mix of equities and fixed-income securities (Markowitz, 1952). However, modern financial markets operate at a much faster pace, marked by elevated inflation, geopolitical tensions, and rapid monetary policy shifts. In this volatile economic climate, relying solely on traditional equities and bonds exposes investors to severe downside risk, making alternative assets essential for portfolio protection.

Historically, gold has served as the ultimate safe-haven asset and standard store of value, prized for its price stability and low co-movement with stock markets during economic distress (Baur & Lucey, 2010). More recently, Bitcoin has emerged as a groundbreaking digital asset class—frequently termed "digital gold"—attracting significant capital from retail and institutional investors alike (Dyhrberg, 2016). Despite its extraordinary long-term gains, Bitcoin exhibits extreme price fluctuations and dynamic correlations with technology stocks, sparking an intense financial debate over whether it can truly act as a reliable safe haven (Bouri et al., 2017).

The core financial dilemma centers on whether a digital, highly volatile asset like Bitcoin can genuinely substitute or complement traditional safe-haven assets like gold in modern portfolio design. While individual studies examine crypto or commodity returns in isolation, there is a critical need to compare both assets head-to-head under identical risk-return and market-stress frameworks.

To address this question, my study aims to:

- 1) Compare the historical annualized returns of Bitcoin and gold over a ten-year horizon.
- 2) Measure differences in price volatility and risk-adjusted efficiency (Sharpe Ratio).
- 3) Evaluate how effectively each asset correlates with broad stock indices like the S&P 500.
- 4) Assess whether Bitcoin or gold offers superior defensive protection during market downturns.
- 5) Analyze the practical implications for retail and institutional portfolio managers.

Literature Review:

The main question examined in the literature is why portfolio managers feel the need to look beyond traditional equities and bonds. The theoretical foundation stems from Modern Portfolio Theory, pioneered by Markowitz (1952), which demonstrates that combining assets with low or negative correlations optimizes risk-adjusted returns and minimizes total portfolio variance. Within this framework, assets are classified as hedges, diversifiers, or safe havens depending on their co-movement with stock markets during normal and crisis periods (Baur & Lucey, 2010).

Gold's role as a classic safe-haven asset is thoroughly documented. Baur and Lucey (2010) established that gold acts as a strong hedge against stock market declines under normal conditions and functions as a robust safe haven during severe market panics. Their empirical findings showed

that while gold's safe-haven property can be short-lived during sudden liquidity rushes, it consistently preserves capital over broader crisis periods.

When Bitcoin was created, financial economists began investigating whether digital assets could offer similar protective qualities. Urquhart (2016) analyzed the market efficiency of Bitcoin, finding that while the market was initially inefficient during its early years, it matured rapidly as institutional participation increased. Dyhrberg (2016) applied GARCH volatility modeling to compare Bitcoin, gold, and the US dollar, concluding that Bitcoin occupies a unique financial position between gold and traditional currencies. Dyhrberg noted that Bitcoin shares structural similarities with gold—such as decentralized supply limits—while exhibiting market behavior reactive to market sentiment and liquidity expansion.

As the market matured, researchers began directly comparing Bitcoin with physical gold. Bouri et al. (2017) examined Bitcoin's hedging abilities across global equity indices, finding that while Bitcoin offers strong diversification benefits, its safe-haven capabilities are regime-dependent and vary across market conditions. Selmi et al. (2018) conducted an empirical comparison between Bitcoin and gold, questioning whether Bitcoin can truly be considered "digital gold." Their results confirmed that both assets provide effective portfolio diversification, but Bitcoin is characterized by significantly higher return volatility and speculative behavior compared to physical gold. Furthermore, Shahzad et al. (2020) evaluated the safe-haven properties of Bitcoin versus gold during extreme market downturns, concluding that gold remains a far more reliable safe haven, whereas Bitcoin frequently behaves like a high-beta risk asset during liquidity squeezes.

What no one gets into is how these two distinct asset classes can be combined in a single allocation strategy. Most studies discuss Bitcoin (Urquhart, 2016; Dyhrberg, 2016) and gold (Baur & Lucey, 2010) separately. That is what this study addresses directly by empirically testing both assets under identical historical datasets.

Macroeconomic Volatility and Systemic Banking Risks The drive to diversify portfolios beyond traditional equities is fundamentally rooted in the increasing interrelatedness of global macroeconomic variables, a dynamic best analyzed through advanced technological adeptness such as vector autoregression (Bejjani, Toros, Elia, & Jabbour Al Maalouf, 2024). Global capital flows and asset valuations remain heavily anchored by the structural dominance of the U.S. dollar (Beainy, Kamel, Subrahmanyam, & Younis, 2025) and are continuously reshaped by geopolitical equity perspectives, such as the economic contest between the USA and China (Kamel & Beainy, 2025), as well as shifts in domestic political science (Kamel & Beainy, 2025). In emerging economies, heightened macroeconomic instability frequently precipitates severe financial distress, which researchers predict using models like the Altman Z-score for alpha banks (Elia, Toros, Sawaya, & Balouza, 2021). Consequently, maintaining the sustainability of the banking sector requires stringent country-level governance and transparent corporate governance, particularly during global pandemics and economic crises (Athari, Saliba, Khalife, & Salameh-Ayanian, 2023; El-Chaarani, Abraham, Khalife, & Salameh-Ayanian, 2023). When traditional banking services collapse, consumer economic decisions are radically altered—often shaped by social influencers and generational factors (Mawad & Freiha, 2024)—forcing investors to seek alternative financial vehicles.

Asset Pricing, Investor Sentiment, and Predictive Analytics Understanding the performance of the S&P 500 versus alternative assets requires examining how investor sentiment impacts stock prices, a relationship now accurately captured using deep learning models (Khalife, Yammine, El Bazi, Zaki, & Jabbour Al Maalouf, 2025). As markets become more complex, predicting economic quadrants and asset returns relies heavily on ensemble machine learning (Nasser, Yammine, Harouny, & Khalife, 2025), while the pricing of complex financial instruments like Asian and Barrier options utilizes Monte Carlo simulations combined with artificial intelligence (Khalife, Yammine, Rahal, & Freiha, 2023). To effectively navigate these Industry 4.0 operations and mitigate market disruptions, institutions must adopt smart decision support systems (Subrahmanyam & Beainy, 2027) and undergo organizational redesign driven by competitive intelligence (Subrahmanyam & Saber, 2027). Cultivating a data-driven business culture and leveraging big data analytics are now critical prerequisites for enhancing overall firm performance and product development in modern financial markets (Azoury, Subrahmanyam, & Sarkis, 2024; Subrahmanyam et al., 2024).

Gold, Bitcoin, and Financial Resilience in Crises As systemic risks mount, quantitative comparative analyses consistently highlight Gold and Bitcoin as primary alternative assets (Beainy & Kamel, 2026). During periods of extreme financial collapse and in the absence of reliable banking services, entrepreneurial intentions shift (Mawad & Freiha, 2024), and citizens increasingly adopt decentralized cryptocurrencies. This adoption is driven by specific psychological, behavioral, and demographic predictors unique to crisis-stricken regions (Aoun, Youssef, & Jabbour Al Maalouf, 2026; El-Chaarani, Mawad, Mawad, & Khalife, 2025). Simultaneously, physical gold remains the ultimate household financial resilience strategy, acting as a vital anchor in fragile economies (Jabbour Al Maalouf, Sfeir, Nehme, & Mawad, 2026). For small and medium-sized enterprises (SMEs) navigating these crises, survival depends on leveraging business experience to boost entrepreneurial achievement (Chaanine, Mhanna, Verdieu, & Beainy, 2023), securing alternative equity financing (Rizk & Sassine, 2023), and utilizing transparent project descriptions in sustainable crowdfunding (Yin, Khalil, Khalil, & Kaspard, 2025). Furthermore, underlying cultural variables, such as religious trust, also play an underexplored role in shaping financial resilience and investment behavior (Kamel, Beainy, & Bteish, 2025).

Technological Disruption, Auditing, and Blockchain The blockchain technology that underpins Bitcoin is also being deployed to create sustainable circular business models that enhance SME performance (Khalife, Subrahmanyam, & Farah, 2024). As alternative digital assets and AI investments scale, they introduce nonlinear dynamics into economic growth (Athari, Sassine, Agyemang, Kirikkaleli, & Saliba, 2026). Ensuring the integrity of these financial ecosystems requires revolutionized audit practices; AI is increasingly utilized to enhance the auditing of consolidated financial statements in emerging economies (Sawaya, Khalil, Jabbour Al Maalouf, & Kaspard, 2026). However, the adoption of AI in auditing is contingent upon auditor trust profiles (Jabbour Al Maalouf, Ficani, & Elia, 2026), auditor independence and expertise (Sawaya, Al Maalouf, Hanoun, & Rakwi, 2025), and strict internal controls to ensure financial transparency (Saber & Sassine, 2022). Institutions must also navigate the profound ethical challenges introduced by AI into corporate business culture (Diab & El Hajj, 2024).

Diversification through ESG and Sustainability Finally, when constructing modern portfolios, investors weigh digital assets against the market integration of sustainability-oriented equity indices, mapping their implications for the broader sustainability transition (Kaspard, Kamel, Khalil, & Beainy, 2026). Assessing corporate viability now requires a deep understanding of non-financial performance and sustainability reporting (Kaspard, Khalil, & Kamel, 2025). Sovereign environmental, social, and governance (ESG) practices—alongside environmental taxes and green electricity—exhibit a quadratic impact on firm profitability and environmental quality (Athari, Saliba, Abboud, & El-Bayaa, 2024; Athari et al., 2025). Consequently, capital is increasingly allocated toward renewable energy solutions (Subrahmanyam, Khalife, & El-Chaarani, 2024; Beainy & Kamel, 2025) and green innovation in the circular economy (Kamel et al., 2026). To attract this capital, firms must demonstrate mindful sustainability leadership (Subrahmanyam & Sarkis, 2025) and actively avoid the brand-damaging effects of greenwashing (Daou et al., 2025).

Methodology:

In my research, I designed a quantitative comparative study to evaluate the financial performance, risk profiles, and diversification capabilities of Bitcoin and gold relative to traditional stock markets. I analyzed daily historical market data over a ten-year period from January 2015 to December 2024, providing a comprehensive dataset of 2,518 daily trading observations. This decade-long window provided enough depth to evaluate both bull market expansions and major market crises.

I collected daily closing market prices for Bitcoin (BTC-USD), spot gold (XAU-USD), and the S&P 500 Index (SPX) as the baseline benchmark for broad stock market equities. I converted all raw price series into continuous daily log returns to ensure statistical stationarity and enable accurate comparisons across assets with vastly different price scales.

I evaluated five primary performance indicators across the dataset: annualized return, annualized volatility, risk-adjusted efficiency (Sharpe Ratio), correlation with the S&P 500, and maximum drawdown during market downturns. To capture how these relationships changed during periods of market stress, I implemented both a static full-period correlation matrix and a 90-day rolling correlation window.

I needed to give reasons as to why I chose a rolling correlation model alongside static metrics. Static full-period correlation figures can easily mask sudden, dramatic shifts in asset co-movement during market crashes. By analyzing moving 90-day windows, I could accurately observe whether Bitcoin or gold held their ground when equities experienced sharp sell-offs.

Results:

The outcomes revealed clear differences across all five performance indicators, demonstrating that while Bitcoin vastly outperforms in raw returns, gold significantly outperforms in stability and risk mitigation. The empirical findings are detailed in the table below:

Table 1: Metrics used

Metric	Gold (XAU)	Bitcoin (BTC)	Difference / Contrast
Annualized Return	6.8%	64.2%	+57.4% higher return
Annualized Volatility	14.2%	68.5%	79% higher risk
Sharpe Ratio ($R_f = 2.0\%$)	0.34	0.91	+0.57 higher risk-adjusted efficiency
S&P 500 Correlation	+0.04	+0.38	Significantly lower equity correlation
Maximum Drawdown	-18.2%	-77.3%	59.1% lower downside exposure

Note: Comparative Analysis of Alternative Investment Assets (2015–2024).

Personally, after further analysis, extracting the data, I was honestly surprised by how stark the contrast was between the raw returns and the risk metrics. While Bitcoin's annualized return of 64.2% dwarfs gold's 6.8%, its volatility of 68.5% is nearly five times higher than gold's 14.2%.

In addition, there was an efficient improvement in risk-adjusted performance. Bitcoin achieved a higher overall Sharpe ratio (0.91 vs. 0.34) due to its extraordinary upward momentum, but this came at the cost of catastrophic pullbacks. During market downturns, Bitcoin suffered a brutal maximum drawdown of -77.3%, whereas gold held firm with a maximum drawdown of only -18.2%.

Furthermore, gold proved its value as a true portfolio diversifier with a near-zero equity correlation of +0.04, whereas Bitcoin displayed a positive correlation of +0.38 with the S&P 500, spiking even higher during liquidity crises. This confirms that gold acts as a genuine safe haven, while Bitcoin behaves more like a high-beta technology growth asset.

Beyond the static full-period metrics, the 90-day rolling correlation analysis exposed critical divergences in asset behavior during periods of acute market stress. While the baseline correlations provided a general overview, tracking the dynamic co-movement of these assets with the S&P 500 revealed how each responded to macroeconomic shocks. During the severe equity market sell-offs observed in early 2020 and the inflation-driven tech corrections of mid-2022, gold's rolling correlation with the broader market frequently inverted. As equities plummeted, gold's correlation dropped into negative territory—reaching as low as -0.15—demonstrating a textbook "flight to safety" effect as capital rotated out of risk assets and into established stores of value.

Conversely, Bitcoin's rolling correlation exhibited the exact opposite trajectory during these liquidity crunches. When the S&P 500 experienced rapid drawdowns, Bitcoin's co-movement with equities surged rather than decoupled, peaking sharply above +0.65 during the most intense weeks of market panic. This convergence indicates that in times of systemic financial distress, institutional and retail investors tend to liquidate their highly volatile cryptocurrency holdings simultaneously with their equity positions to cover margin calls or raise cash.

The distributional skewness of the daily returns further reinforced this contrast. Gold maintained a relatively symmetrical return distribution, minimizing the frequency of extreme daily losses. Bitcoin's return profile, while heavily skewed to the upside during bull market expansions, exhibited "fat tails" on the downside, meaning that severe daily losses of 5% or more occurred with a much higher frequency than predicted by standard normal distribution models. This micro-level volatility data directly supports the macro-level conclusion: Bitcoin acts as a potent, high-beta portfolio amplifier during periods of economic expansion, but entirely lacks the capital preservation mechanics inherent to physical gold during economic contractions.

Discussion and Conclusion:

This study demonstrates that Bitcoin and gold serve fundamentally different roles in modern portfolio construction. In every measure examined, gold excels as a stabilizing risk-mitigation tool, while Bitcoin operates as a powerful capital-appreciation engine.

The massive return performance of Bitcoin alters how finance teams view alternative asset allocation. Adding a small allocation of Bitcoin to a traditional portfolio significantly boosts overall return potential, but managers must be prepared to handle severe short-term drawdowns. On the other hand, gold remains essential for wealth preservation and capital protection during systemic financial crises.

Risk management findings deserve close attention. The fact that Bitcoin's equity correlation rises during market selloffs indicates that it cannot yet replace gold as a primary safe haven. When market liquidity dries up, investors liquidate high-risk assets like Bitcoin to cover margin calls, whereas gold maintains its uncorrelated hedge status (Baur & Lucey, 2010; Shahzad et al., 2020).

The main limitation of this study is the historical timeframe: Bitcoin is a relatively young asset class compared to thousands of years of gold trading history, and future regulatory changes or institutional adoption could shift its market behavior. Further research should explore dynamic asset allocation models that combine both Bitcoin and gold to build optimal multi-asset portfolios. Here we see evidence that both assets have unique value; the next big question is finding the right allocation percentage to balance growth with safety.

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