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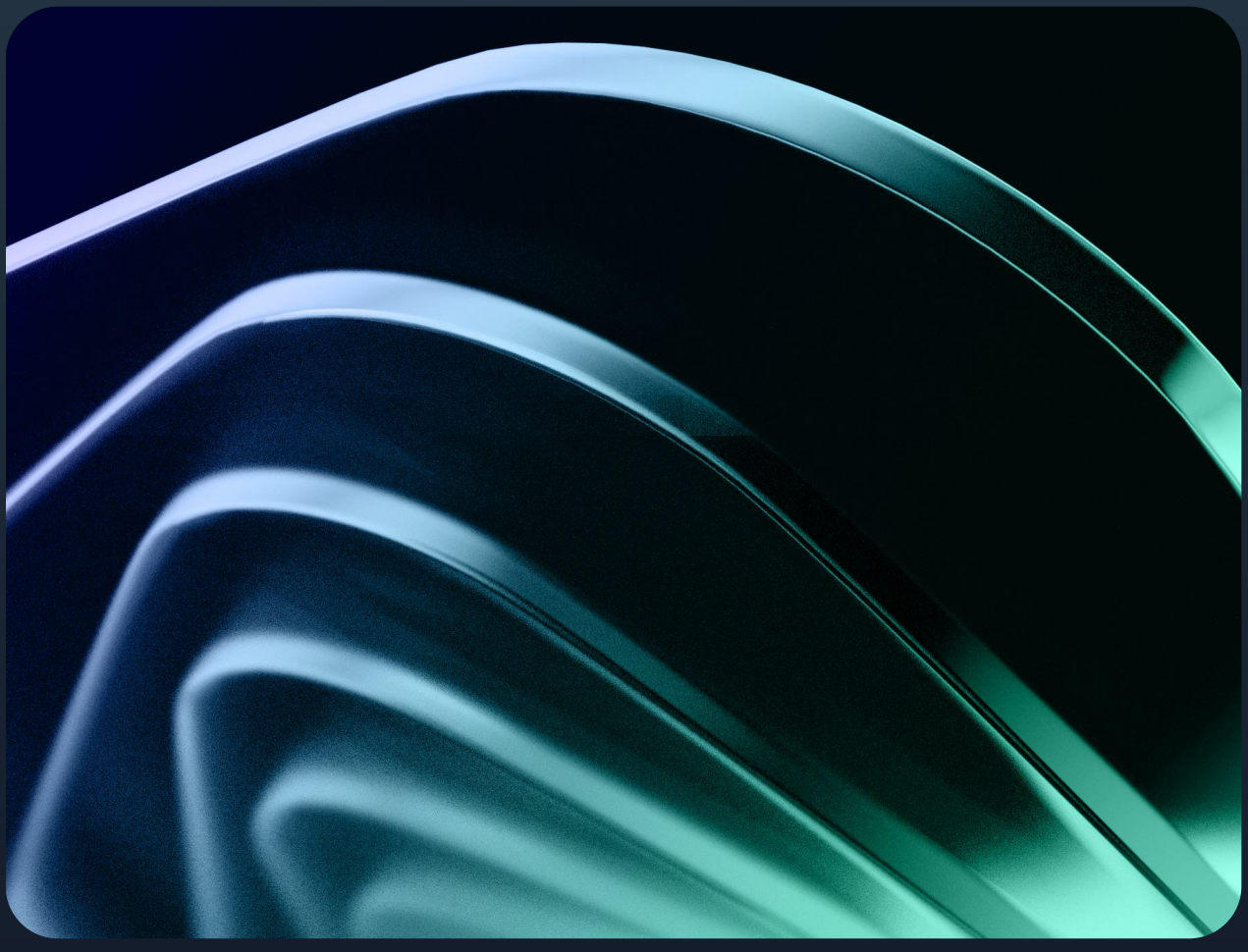
Building Bitcoin Capital Market Assumptions

A Practitioner's Framework for Strategic and Tactical Allocations



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Authors

Gabriel Selby, CFA
Head of Research

Gabriel Selby, CFA, is the Head of Research at CF Benchmarks, where he leads market analysis and outlook initiatives, providing timely insights and in-depth information on the firm's product offerings. His work focuses on advancing institutional understanding of digital asset markets, driving research-driven innovation, and supporting the institutional adoption of cryptocurrencies while positioning CF Benchmarks as a leading index provider in the industry.

Previously, Gabriel served as VP of Product Strategy for the Global Investment Lab at Citi Private Bank, where he developed customized portfolio analytics and investment recommendations for institutional investors and ultra-high-net-worth (UHNW) clients.

Before that, he was the Investment Strategist for the Americas at Deutsche Bank in New York, playing a key role in capital market forecasting and shaping the DB Wealth Management house view as part of the multi-asset global strategy team. Gabriel also served as an active member of the Deutsche Bank Investment Committee, which oversaw $20 billion in discretionary mandates. In this role, he contributed to the firm's tactical asset allocation decisions, sector scoring models, and high-conviction trade ideas.

Mark Pilipczuk
Research Analyst

Mark Pilipczuk is a Research Analyst at CF Benchmarks. In his role, he conducts in-depth analyses of digital asset markets, focusing on on-chain adoption, regulatory developments, and macroeconomic trends. His work supports CF Benchmarks by providing data-driven insights that enhance the firm's index offerings and analytical frameworks, enabling institutional investors to navigate the evolving digital asset landscape with confidence.

Prior to joining CF Benchmarks, Mark served as an Investment Associate at Cambridge Associates, a global investment firm that works with endowments, foundations, pensions, private clients, and other institutions. In this role, he advised endowments and foundations on constructing multi-asset portfolios tailored to their long-term objectives and risk tolerances. His expertise encompassed investment manager due diligence, asset allocation policies, and developing investment committee governance structures to enhance decision-making and oversight across traditional and alternative asset classes.

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Executive Summary

Bitcoin's institutional adoption requires sophisticated yet pragmatic capital market assumption (CMA) frameworks that incorporate quantitative modeling, macroeconomic analysis, and strategic allocation principles. Our comprehensive framework establishes a three-model architecture supporting both strategic (1-10 year) and tactical (sub-1 year) investment horizons through comparative valuation, production economics, and Bitcoin's sensitivity to monetary debasement. Recent institutional surveys reveal that 73% of investors recognize the long-term value of blockchain and digital assets, with 68% expecting to increase allocations over the next two years. These adoption trends underscore the necessity of rigorous CMA frameworks for disciplined portfolio construction and risk management.

In summary, our modeling framework supports a base-case long-term price target of $1.42 million per Bitcoin by 2035, driven by Bitcoin capturing roughly one-third of the growing global store-of-value market. At the same time, volatility is projected to continue its structural decline, falling toward 28% over the next decade as liquidity deepens, institutional participation expands, and derivatives markets mature. This combination of high expected returns, moderating volatility, and persistently low correlations positions Bitcoin as a compelling addition to a multi-asset portfolio. Even at 2–5% portfolio weights, Bitcoin improves long-term risk-adjusted returns and expands the efficient frontier.

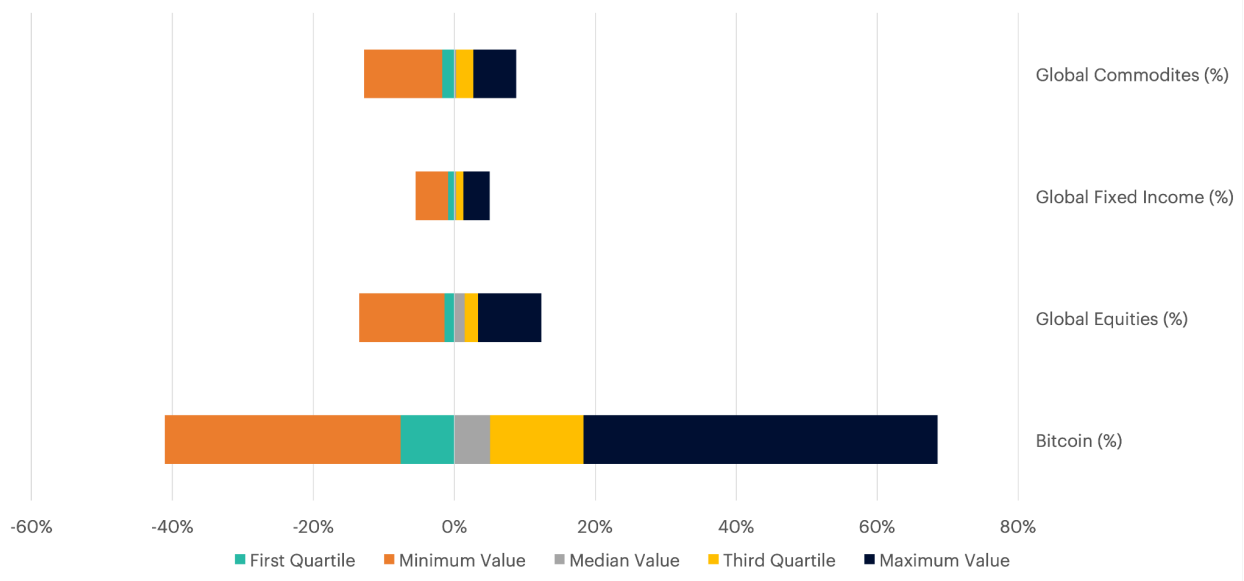
I. Return Assumptions Frameworks

Understanding Bitcoin's Return Profile

Bitcoin exhibits a distinctive asymmetrical return distribution that fundamentally distinguishes it from traditional asset classes and supports its allocation as a strategic portfolio component. An asymmetrical return profile describes an investment where potential upside returns significantly exceed potential downside losses, creating a favorable risk-reward dynamic for investors.

Analysis of Bitcoin's monthly return distribution over a ten-year observation period through September 30, 2025 reveals this asymmetry in stark terms. Bitcoin's median monthly return of 5.78% compares favorably to global equities at 1.48%, global fixed income at 0.31%, and global commodities at 0.21%. More significantly, the third quartile monthly return for Bitcoin reaches 20.11%, nearly six times that of global equities at 3.36%. At the upper extreme, Bitcoin's maximum monthly return of 68.59% dwarfs the 12.33% maximum for global equities, demonstrating the asset's capacity for explosive appreciation during favorable market conditions.

Figure 1: Bitcoin's Asymmetrical Return Distribution



Source: Bloomberg, as of 11/30/2025

The downside characteristics, while more volatile than traditional assets, tell an equally important story. Bitcoin's minimum monthly return of -41.07% and first quartile return of -7.60% represent larger drawdowns than global equities (-13.50% and -1.40% respectively). However, the magnitude of upside returns relative to downside losses creates a positively skewed distribution. This skewness means investors have historically gained more during Bitcoin's appreciation phases than they lost during depreciation phases, generating positive expected returns even after accounting for volatility.

This asymmetrical profile stems from Bitcoin's unique market structure and adoption dynamics. As a nascent monetary technology with a fixed supply schedule, Bitcoin experiences demand surges that cannot be met with increased production, driving sharp price appreciation. Conversely, downside movements, while sometimes severe, occur against a backdrop of growing institutional infrastructure, increasing regulatory clarity, and expanding adoption that provides natural support levels. The result is an asset whose long-term trajectory trends upward through cycles of expansion and consolidation, with each successive cycle establishing higher price floors.

For portfolio construction purposes, Bitcoin's asymmetry creates a compelling case for strategic allocation even with relatively modest position sizes. A small allocation captures substantial upside participation during favorable periods while limiting absolute downside exposure through position sizing. This characteristic becomes particularly valuable in portfolio contexts where traditional assets exhibit high correlations during market stress, as Bitcoin's independent return drivers can provide differentiated performance.

Understanding this asymmetrical profile provides the foundation for constructing both strategic and tactical return assumptions. The strategic framework must account for Bitcoin's long-term appreciation potential while acknowledging near-term volatility, while the tactical approach should leverage the asset's sensitivity to macroeconomic regime shifts and liquidity cycles. The following sections develop quantitative methodologies for modeling these dynamics and establishing probability-weighted return scenarios across multiple time horizons.

What Macroeconomic Variables Influence Bitcoin’s Price

Bitcoin was initially designed to serve as a medium of exchange that could be transferred outside the influence of any company or government. Over time, however, it found product-market fit as a store of value, with prominent investors increasingly recognizing this role. Billionaire hedge fund manager Paul Tudor Jones has been particularly vocal, stating in 2020 that Bitcoin reminds him of "the role gold played in the 1970s" and calling it "the fastest horse" as an inflation hedge. More recently, he declared, "All roads lead to inflation. I'm long

gold, I'm long Bitcoin," positioning both assets as essential hedges against monetary debasement.

Stanley Druckenmiller noted Bitcoin "could be an asset class that has a lot of attraction as a store of value," particularly for younger investors. He suggested that "if the gold bet works, the Bitcoin bet will probably work better." ARK Invest's Cathie Wood projects Bitcoin could reach $1.2 million by 2030 with institutional allocations potentially hitting 6.5%.

This narrative shift reflects Bitcoin's growing acceptance, even as its correlation with traditional stores of value such as gold has diminished over time, despite their conceptual similarities. More importantly, Bitcoin has significantly outperformed gold. It functions both as a store of value and as a "risk-on" asset. Unlike gold's centuries-long track record, Bitcoin carries thesis risk due to its relatively short history and the ongoing debate over its ultimate role in the global financial system. While this uncertainty introduces risks absent in gold, it also creates opportunities for investors willing to make informed judgments about Bitcoin's long-term position within that system.

We can use two frameworks to create long-term (or strategic) price projections for Bitcoin. The first is a comparative valuation analysis, which assumes Bitcoin's share of the store-of-value market will grow alongside the overall market. The second is a cost of production model, similar to how traditional commodities like oil establish price floors based on production costs. However, Bitcoin differs fundamentally from conventional commodities: its cost of production consistently increases over time due to mining difficulty adjustments and network design, rather than fluctuating with supply and demand dynamics. Together, these frameworks provide complementary approaches to understanding Bitcoin's potential price trajectory based on macroeconomic factors.

The Comparative Market Capitalization Valuation Framework

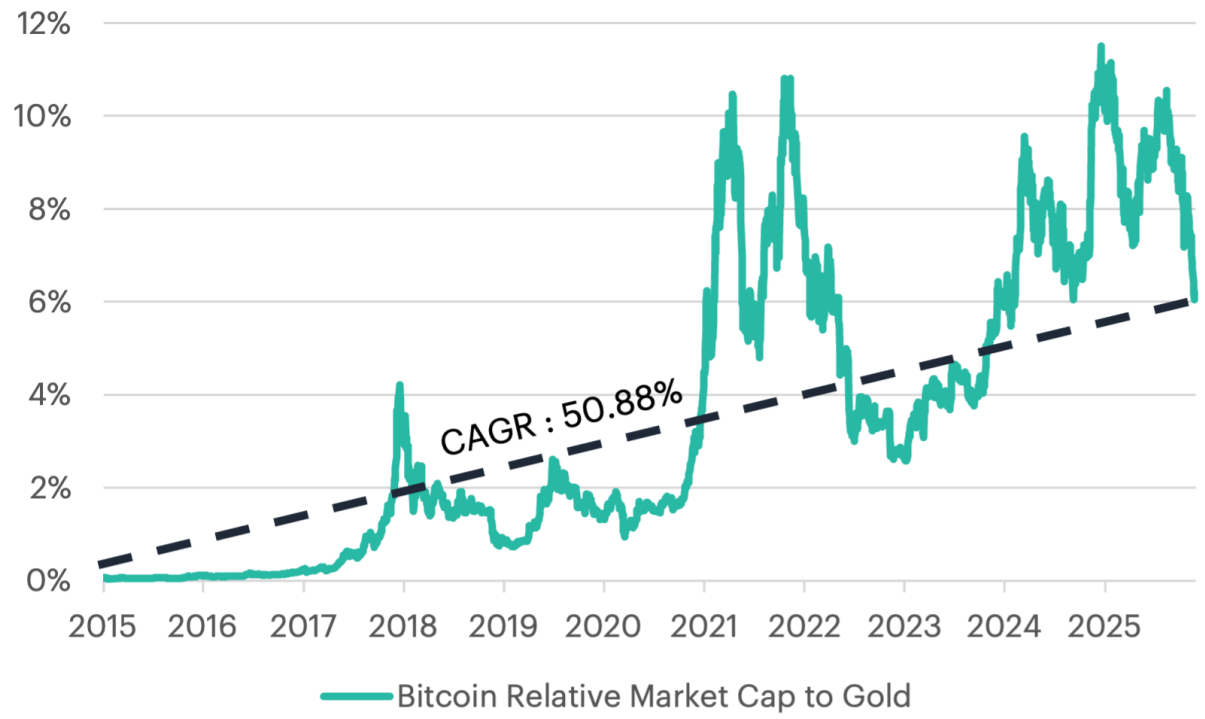
The comparative value (or relative value) approach evaluates Bitcoin by drawing an analogy to gold within the broader store-of-value market. This market consists of assets that are primarily held for wealth preservation rather than productive use. Historically, gold has been the dominant store of value, although other precious metals and, recently, digital alternatives such as Bitcoin also play significant roles.

Our framework assumes that the store-of-value market will continue to expand over time, driven by factors including global monetary supply growth, persistent inflation concerns, and geopolitical uncertainty. To derive a valuation for Bitcoin, investors must first estimate the

current size of the store-of-value market, which is approximately $30 trillion and largely dominated by gold's market capitalization of roughly $28 trillion. The next step is to project a long-term growth rate for the gold market, such as 10.5% annually, in line with the historical price appreciation for gold. Finally, investors assign Bitcoin a future market share based on adoption trends.

Over the next decade, Bitcoin's share of gold's market capitalization could rise from roughly 6.1% today to between 16% and 33% if it continues to grow at either its trend rate or at twice that pace, reflecting its advantages in portability, divisibility, and verifiability. We also account for scenarios in which Bitcoin reaches parity with gold's market cap or surpasses it, potentially rising to 125% of gold's valuation as these structural advantages drive continued adoption.

Figure 2: Bitcoin Market Cap Relative to Gold

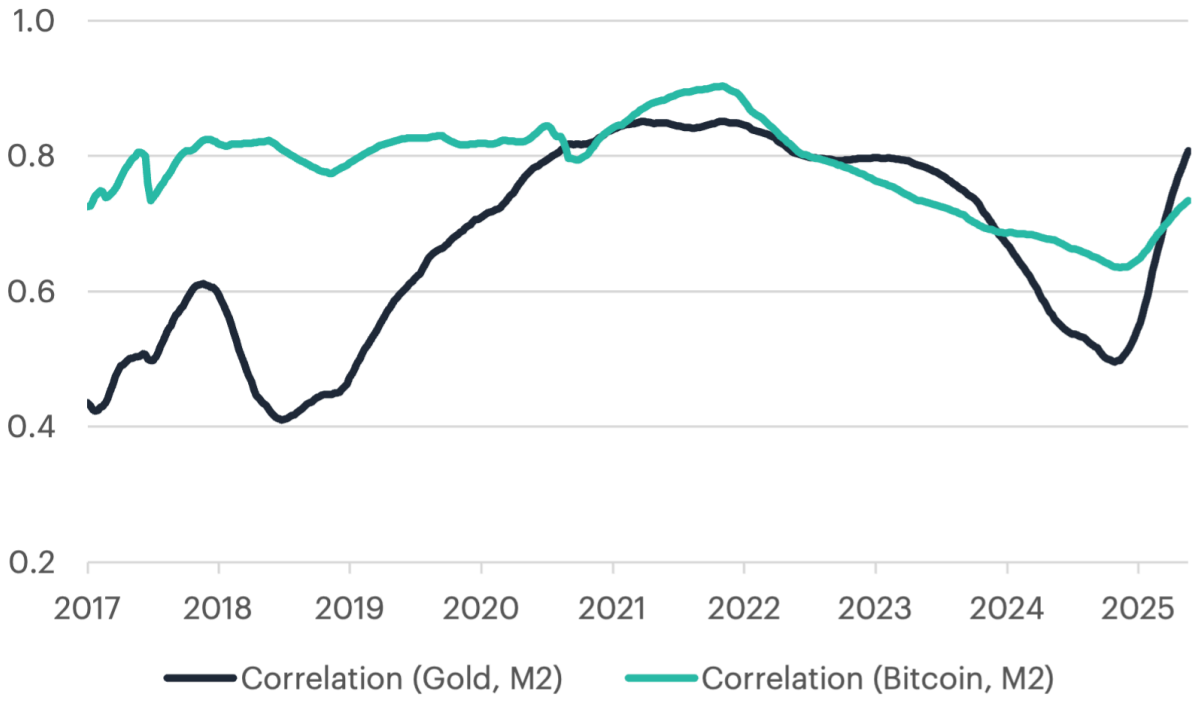


Source: Bloomberg, as of 11/30/2025

The validity of this approach stems from Bitcoin's shared characteristics with gold. Both assets have limited supply, with Bitcoin capped at 21 million coins and gold's supply growing at approximately 1.5% per year. Each asset is highly liquid in global markets and has historically served as a hedge against fiat currency debasement.

Bitcoin's digital form, however, introduces several additional advantages. These include seamless cross-border transferability, transparency, and programmability, which enhance its appeal in an increasingly digitized global economy. Empirical evidence supports this positioning. Over the past five years, both Bitcoin and gold have shown positive correlations with changes in global M2, and these correlations have exhibited similar patterns in direction and magnitude. The correlations generally strengthen during periods of significant monetary expansion and weaken when monetary conditions are more stable.

Figure 3: 5YR Weekly Bitcoin and Gold Correlation to Global M2



Source: CF Benchmarks, Bloomberg, as of 11/30/2025

Modeling Bitcoin's Price Through Store-of-Value Market Penetration

$$Price = \frac{S_T \, x \, MC_{Gold} \, x \, ((1+(g \, x \, CF))^T}{BTC \; Supply}$$

Where

S_T = Bitcoin's market cap relative to gold at time T

MC_{Gold} = Gold's Current Market Cap

g = Estimated growth rate for gold's market cap

BTC Supply = Estimate for the total Bitcoin Supply at time T

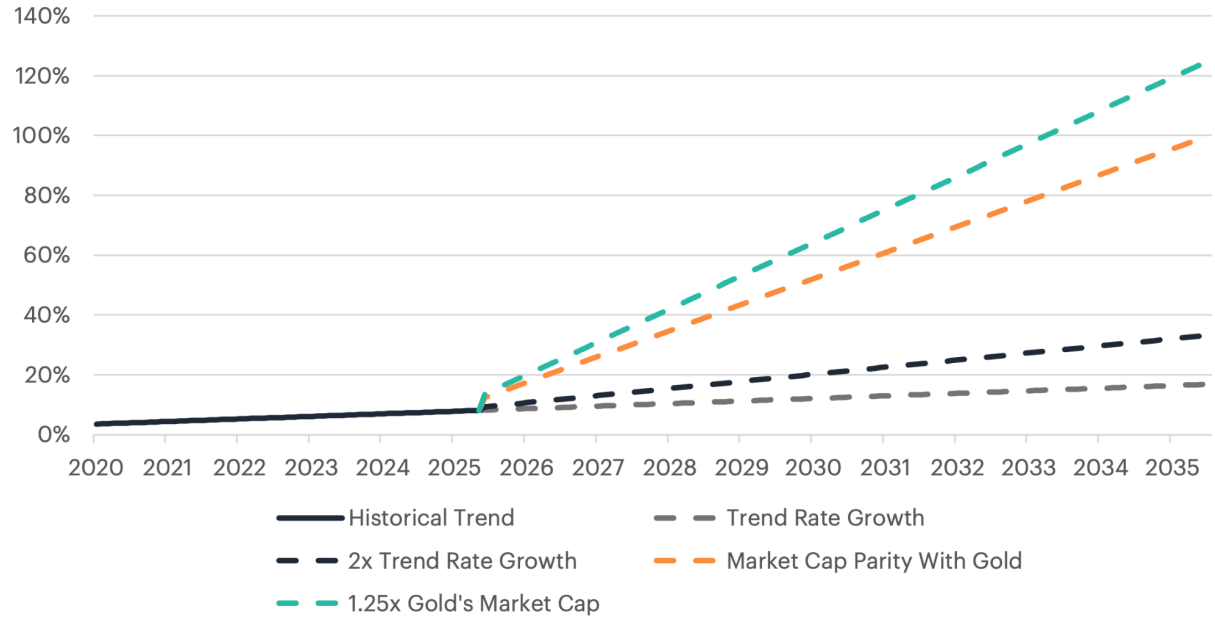
CF = Cannibilization factor (Where 1 is equal to 100% of gold's growth rate)

To estimate Bitcoin's long-term valuation potential, we applied two approaches that generate four distinct price scenarios. Both approaches assume Bitcoin's market capitalization will achieve a specific percentage of gold's market capitalization by 2035, while explicitly accounting for gold's own projected growth trajectory.

The first approach uses trend projections derived from a linear regression model of Bitcoin's market cap relative to gold. This model assumes Bitcoin could reach 17% of gold's market cap by 2035 under current adoption trends. An accelerated scenario assumes investor demand for alternative stores of value doubles, causing Bitcoin to reach 34% of gold's market cap within the same timeframe. Critically, these projections incorporate gold's expected market cap expansion based on its 20-year historical growth rate of 10.2% annually, reflecting continued global monetary expansion and central bank accumulation trends.

The second approach considers scenarios where Bitcoin achieves market cap parity with gold or exceeds it by 25% over the next decade. These scenarios reflect outcomes in which Bitcoin becomes the dominant digital store of value and captures significant market share from traditional precious metals. In these scenarios, we apply a cannibalization adjustment to gold's growth rate, recognizing that Bitcoin's ascendance would likely moderate gold's own market cap expansion as capital flows shift between the two assets.

Figure 4: Projected Bitcoin Market Cap Relative to Gold

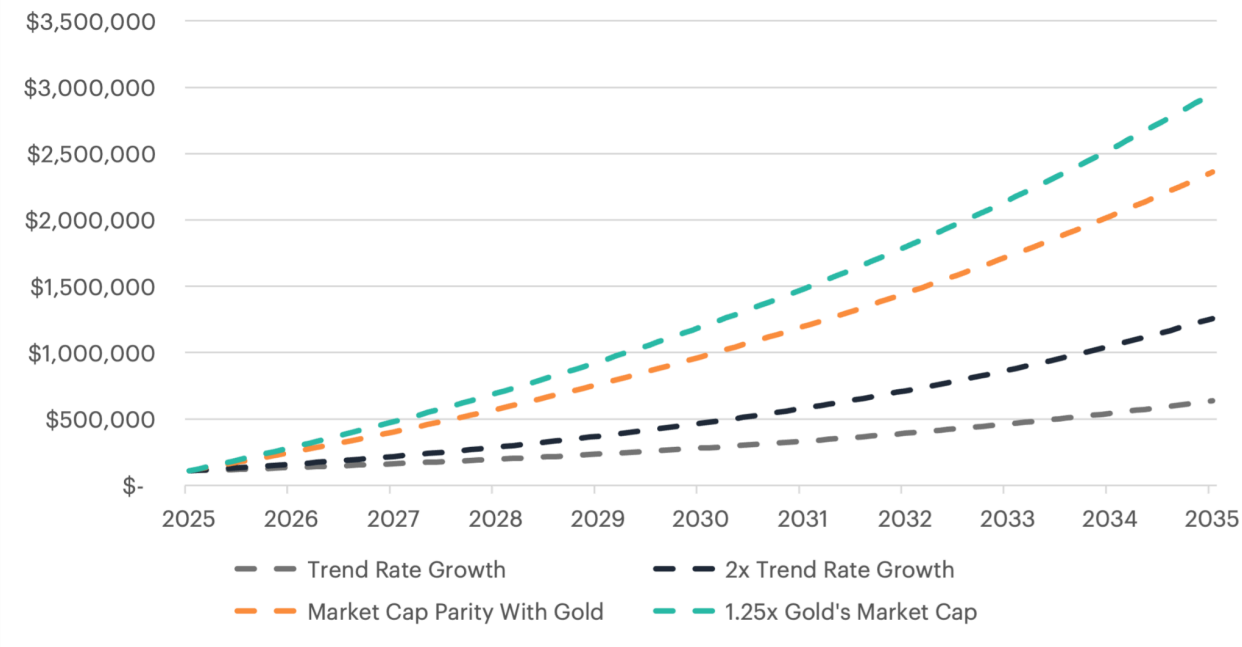


Source: Bloomberg, as of 11/30/2025

Assuming that Bitcoin's relative market capitalization continues to expand at its historical trend rate, we would expect Bitcoin's price to grow at a compound annual growth rate (CAGR) of 18.9%, reaching approximately $620,000 per coin by 2035. This scenario assumes the ratio of Bitcoin's to gold's market cap increases from 8% to 17%, while gold itself maintains its 20-year average growth rate of 10.2% annually—a baseline derived from historical data on global wealth accumulation, central bank reserve diversification, and inflation hedging demand.

If adoption strengthens and Bitcoin grows at twice its trend rate, our model projects a CAGR of 29.9%. Under this accelerated scenario, Bitcoin would reach 33% of gold's market cap, with an estimated price of approximately $1,230,000 per coin over the same timeframe.

Figure 5: Bitcoin Long-Term Price Targets



Source: CF Benchmarks, as of 11/30/2025

In the parity scenario, we adjust gold's projected growth rate downward to 5.75% annually, applying a 50% cannibalization factor to its 20-year historical average. This modification reflects the economic reality that as Bitcoin captures meaningful market share within the store-of-value category, gold's own growth trajectory would moderate. The total addressable market for non-yielding store-of-value assets continues expanding with global wealth, but Bitcoin's rise necessarily redistributes demand that would otherwise flow entirely to gold. Under these revised assumptions, Bitcoin could reach approximately $2.35 million per coin over the next decade, representing an annualized return of 38.3%. In a scenario where Bitcoin's market capitalization exceeds gold's by 25%, the model implies an annualized return of 41.4%, corresponding to a price of roughly $3.0 million per coin within the same timeframe.

Implementing Gold Growth Rate Assumptions

Analysts can refine these projections by incorporating gold-specific capital market assumptions derived from institutional forecasting methodologies. The World Gold Council's supply-demand equilibrium framework and return attribution models (GRAM) provide rigorous foundations for estimating gold's market cap trajectory under various macroeconomic scenarios. Key inputs include:

- **Structural demand shifts:** Central bank accumulation patterns, particularly among emerging market monetary authorities diversifying reserves away from USD-denominated assets
- **Real yield relationships:** The inverse correlation between gold prices and real interest rates, which institutional models typically estimate using 10-year TIPS yields
- **Inflation hedging demand:** Gold's historical role as an inflation hedge, with elevated inflation volatility supporting higher price levels
- **Supply constraints:** Mine production growth averaging just 0.3% annually, limiting supply-side responsiveness to price increases

By incorporating scenario-based gold market cap assumptions—ranging from conservative (4-5% annual growth reflecting normalized monetary conditions) to elevated (10%+ growth under persistent inflation or currency debasement concerns)—analysts can construct probability-weighted Bitcoin valuations that account for the dynamic relationship between these two store-of-value assets.

To evaluate the sensitivity of these projections, we varied the key inputs around the parity scenario by adjusting Bitcoin's market-cap share in 5% increments and modifying gold's growth rate by 1%. Because the range of possible outcomes is wide, a probability-weighted approach provides a more practical estimate of long-term fair value. Assigning probabilities of 60% to the double-trend growth scenario, 20% to the trend-based scenario, 10% to parity with gold, and 10% to Bitcoin exceeding gold yields a target price of approximately $1.42 million per coin and an expected annualized return of 30.1% over the next decade.

Figure 6: Model Sensitivity Analysis

Gold Growth Rate	Bitcoin as a Percentage of Gold's Market Cap										
	75%	80%	85%	90%	95%	100%	105%	110%	115%	120%	125%
1.0%	$1,104,915	$1,178,576	$1,252,237	$1,325,898	$1,399,559	$1,473,220	$1,546,881	$1,620,542	$1,694,203	$1,767,864	$1,841,525
2.0%	$1,220,967	$1,302,365	$1,383,763	$1,465,161	$1,546,559	$1,627,957	$1,709,354	$1,790,752	$1,872,150	$1,953,548	$2,034,946
3.0%	$1,349,097	$1,439,037	$1,528,977	$1,618,917	$1,708,856	$1,798,796	$1,888,736	$1,978,676	$2,068,616	$2,158,556	$2,248,495
4.0%	$1,490,549	$1,589,919	$1,689,289	$1,788,659	$1,888,029	$1,987,399	$2,086,769	$2,186,139	$2,285,509	$2,384,879	$2,484,249
5.0%	$1,646,697	$1,756,476	$1,866,256	$1,976,036	$2,085,816	$2,195,595	$2,305,375	$2,415,155	$2,524,935	$2,634,715	$2,744,494
6.0%	$1,819,051	$1,940,321	$2,061,591	$2,182,861	$2,304,131	$2,425,401	$2,546,672	$2,667,942	$2,789,212	$2,910,482	$3,031,752
7.0%	$2,009,280	$2,143,232	$2,277,184	$2,411,136	$2,545,088	$2,679,039	$2,812,991	$2,946,943	$3,080,895	$3,214,847	$3,348,799
8.0%	$2,219,219	$2,367,166	$2,515,114	$2,663,062	$2,811,010	$2,958,958	$3,106,906	$3,254,854	$3,402,802	$3,550,750	$3,698,698
9.0%	$2,450,891	$2,614,284	$2,777,677	$2,941,070	$3,104,462	$3,267,855	$3,431,248	$3,594,641	$3,758,033	$3,921,426	$4,084,819

Gold Growth Rate	Bitcoin as a Percentage of Gold's Market Cap										
	75%	80%	85%	90%	95%	100%	105%	110%	115%	120%	125%
1.0%	26.6%	27.4%	28.1%	28.9%	29.6%	30.2%	30.9%	31.5%	32.1%	32.6%	33.2%
2.0%	27.8%	28.7%	29.4%	30.2%	30.9%	31.6%	32.2%	32.8%	33.4%	34.0%	34.5%
3.0%	29.1%	29.9%	30.7%	31.5%	32.2%	32.9%	33.5%	34.1%	34.7%	35.3%	35.9%
4.0%	30.4%	31.2%	32.0%	32.8%	33.5%	34.2%	34.9%	35.5%	36.1%	36.7%	37.2%
5.0%	31.7%	32.6%	33.4%	34.1%	34.9%	35.6%	36.2%	36.8%	37.5%	38.0%	38.6%
6.0%	33.0%	33.9%	34.7%	35.5%	36.2%	36.9%	37.6%	38.2%	38.8%	39.4%	40.0%
7.0%	34.4%	35.2%	36.0%	36.8%	37.6%	38.3%	39.0%	39.6%	40.2%	40.8%	41.4%
8.0%	35.7%	36.6%	37.4%	38.2%	38.9%	39.7%	40.3%	41.0%	41.6%	42.2%	42.8%
9.0%	37.1%	37.9%	38.8%	39.6%	40.3%	41.1%	41.7%	42.4%	43.0%	43.6%	44.2%

Source: CF Benchmarks, as of 11/30/2025

The Cost of Production Framework

In traditional commodity markets, the cost of production establishes a fundamental price floor while simultaneously influencing long-term supply dynamics. For commodities like oil, copper, or agricultural products, technological advancement typically reduces production costs through improved extraction techniques, enhanced processing efficiency, or superior logistics. This efficiency-driven cost reduction generally exerts downward pressure on commodity prices over time, as producers can profitably supply markets at lower price points. Bitcoin fundamentally diverges from this pattern through its algorithmic difficulty adjustment mechanism. Since 2010, while mining hardware efficiency has improved by over 1,000,000x, Bitcoin's network difficulty has increased proportionally, resulting in production costs that have risen from pennies to approximately $40,000-$50,000 per Bitcoin today. This unique feature ensures that production costs tend to rise rather than fall with technological progress, creating a cost structure that behaves opposite to traditional commodities and establishing an upward-drifting production cost floor that supports long-term price appreciation.

Bitcoin mining is currently projected to generate approximately $17.3 billion in revenue in 2025, even after accounting for the halving event's impact on block rewards. Ongoing technological advancements are driving significant efficiency improvements, with next-generation 3-nanometer ASICs expected to achieve energy efficiency levels below 10 joules per terahash, partially offsetting rising network difficulty.

This upward cost pressure creates distinctive investment dynamics that differentiate Bitcoin from both traditional commodities and other digital assets. Historical data reveal a strong correlation between Bitcoin's network hashrate and its overall market capitalization. This relationship suggests that increased capital investment in mining infrastructure can serve as a leading indicator of potential price appreciation, as higher network participation often reflects growing confidence in Bitcoin's long-term value proposition.

Mining Economics and Energy Market Dynamics

The economics of Bitcoin mining encompass more than simple production cost analysis. Mining introduces demand-responsive energy consumption that can monetize stranded or underutilized energy resources while providing grid stabilization services. This energy arbitrage component adds economic value beyond the basic provision of network security through hashrate.

Investment Cycles and Supply Dynamics

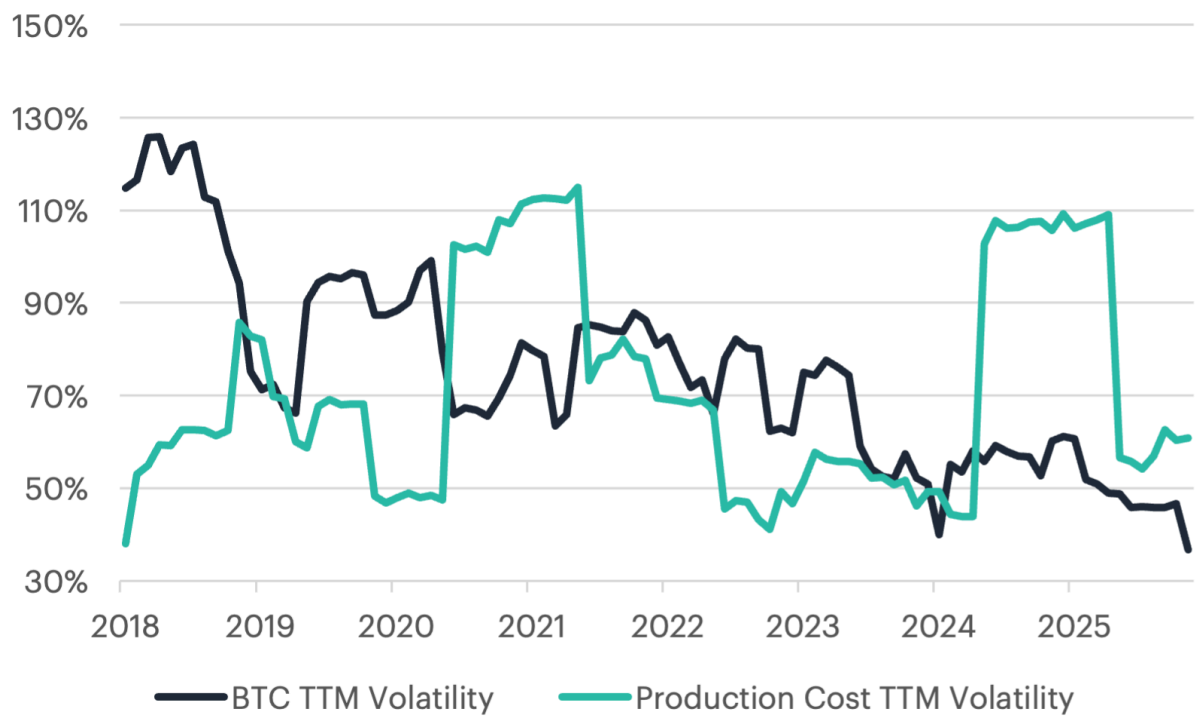
Capital flows into mining hardware create cyclical supply-side pressures on Bitcoin's price. When Bitcoin's market price rises substantially above its production cost, miners typically increase investment in new equipment. This expansion often coincides with higher selling pressure as miners liquidate holdings to fund growth. Conversely, when Bitcoin trades near or below its estimated production cost, capital investment declines and miners reduce selling activity to preserve their holdings.

This investment cycle is amplified by the divergence between Bitcoin's price volatility and the relative stability of network hashrate growth. The hashrate tends to increase steadily over time, while price can experience dramatic swings, creating periodic misalignments between production economics and market valuations.

Institutional Mining Operations

Institutional investment in mining, particularly from publicly traded companies, has introduced sophisticated supply-side dynamics. These professional operators employ advanced financial strategies including treasury management, debt financing backed by mining capacity, and derivatives-based hedging programs. Such approaches have helped maintain consistent capital inflows into the mining sector, even following the market correction of 2021-2022.

Figure 7: Bitcoin and Production Cost Volatility:



Note: the increasing convergence between price volatility and production cost stability over time, suggesting growing maturation of mining economics. (Source: Coinmetrics, Bloomberg, as of 11/30/2025)

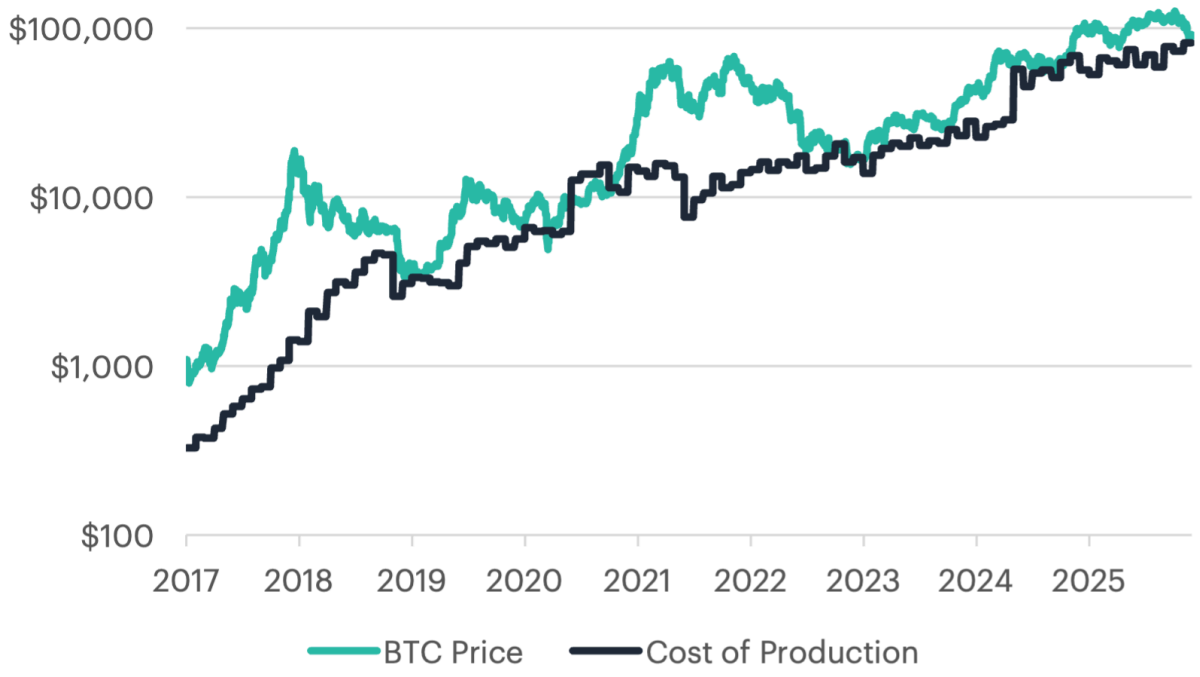
To estimate the historical cost of Bitcoin production, the model uses network difficulty and hashrate data to approximate total network energy consumption. This enables calculation of the energy required to mine a single Bitcoin, which is then converted to production cost using an assumed electricity rate of $0.06 per kilowatt-hour. This rate corresponds to the 10th percentile for industrial electricity in the United States, representing the competitive advantage available to efficient mining operations with access to low-cost power. Importantly, this conservative assumption means the model likely understates actual network-wide production costs, as many miners operate at higher electricity rates, providing an additional margin of safety for valuation purposes.

Historical analysis reveals that Bitcoin's production cost typically rises toward its market price during periods of high profitability, reflecting capital inflows into the mining sector. The impact of Bitcoin's past two halving events is clearly visible in these patterns, as each halving caused

a sharp increase in the per-coin production cost by reducing block rewards while hashrate continued rising.

From an investment perspective, historical trends indicate that periods when Bitcoin trades below its estimated production cost have often preceded favorable entry points for accumulation. These periods typically reflect miner capitulation and reduced selling pressure, creating potential opportunities for long-term investors to establish or increase positions.

Figure 8: Bitcoin vs. Cost of Production



Note: Logarithmic scaling reveals the consistent relationship between production costs and long-term price trends, with notable deviations representing potential tactical opportunities (Source: Bloomberg, Company Filings, Coinmetrics, as of 11/30/2025)

Based on this observed convergence between Bitcoin's price and its production cost, a long-term cost-of-production model can serve as a foundation for estimating Bitcoin's fair value and informing tactical allocation decisions. The model suggests three distinct pricing regimes: (1) prices significantly below production cost indicate potential accumulation opportunities with favorable risk-reward profiles; (2) prices near production cost represent equilibrium conditions with balanced risk; and (3) prices substantially above production cost suggest elevated valuations that may warrant tactical profit-taking or position reduction.

Historical analysis indicates that Bitcoin has spent approximately 15% of its trading history below estimated production cost, 25% within 20% of production cost, and 60% trading at premiums exceeding 20% above production cost.

Model Limitations and Considerations

While the cost-of-production framework provides valuable insight into Bitcoin's fundamental support levels, several factors limit its precision. Geographic variation in electricity costs, the increasing sophistication of mining derivatives markets, and the growing role of renewable energy sources introduce complexity not captured in simplified production cost models. Additionally, the model assumes rational miner behavior during periods of distress, which may not hold during extreme market dislocations. Therefore, production cost estimates should be considered as indicative ranges rather than precise price targets, best used in conjunction with other valuation methodologies.

Model Framework

The model employs the following formula to estimate production cost:

$$Cost\ Per\ Bitcoin\ = \frac{(Hashrate\ x\ E_{miner}\ x\ 24)\ x\ P_{Energy}}{Issuance}$$

Where:

Hashrate = Total network computational power (terahashes per second)

E_{Miner} = ASIC power consumption (watts per terahash)

24 = Hours per day miners operate

P_{Energy} = Average electricity cost per megawatt-hour

Issuance = Daily Bitcoin block rewards

Hashrate Assumptions

Our model uses Bitcoin’s current network hashrate as the starting point and assumes growth will decelerate over the next decade. Hashrate growth is projected to decline from its five-year average of 46% to an initial 40%, then gradually decrease to 24.7% annually by 2035. This deceleration reflects the natural maturation of the mining industry and converges with the historical rates of ASIC efficiency improvements.

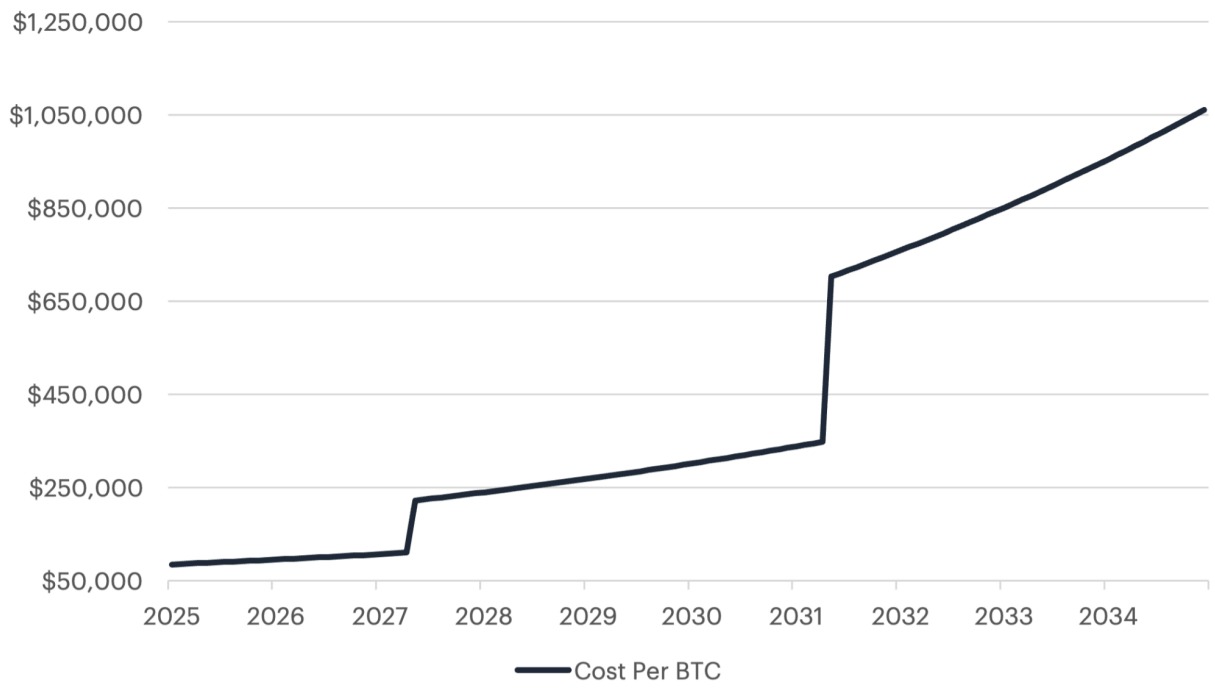
Efficiency Assumptions

Miner efficiency is expected to improve by 19.8% annually in our model, meaning miners will consume progressively less power for equivalent computational output. Based on company filings, the average efficiency among publicly listed miners currently stands at 19.7 watts per terahash. However, to account for less efficient private operators across the broader network, we applied a 30% adjustment, yielding an average starting efficiency of 25.7 watts per terahash.

Electricity Cost Assumptions

The model assumes that over the long term, only large-scale miners with access to low-cost electricity will remain competitive. Consequently, the baseline electricity cost is set at $0.05 per kilowatt-hour ($50 per megawatt-hour), increasing annually by 3% in line with expected inflation.

Figure 9: Bitcoin Cost of Production Model



Source: CF Benchmarks, as of 11/30/2025

Applying these assumptions, the cost of production model produces a 10-year price target of approximately $1,060,000 per Bitcoin, implying an expected annualized return of 27.6% over

the period. The largest changes in the model's output occur during halving events, when Bitcoin's issuance rate is reduced every four years. Sensitivity analysis shows that the model is most responsive to variations in hashrate growth and ASIC efficiency improvements, as these factors significantly influence Bitcoin's underlying production cost structure.

Figure 10: Sensitivity Analysis

Annual Miner Efficiency Gain	Initial Hash Rate Growth 32.5%	35.0%	37.5%	40.0%	42.5%	45.0%	47.5%
-23%	$423,337	$508,812	$609,501	$727,762	$866,265	$1,028,030	$1,216,464
-22%	$480,967	$578,078	$692,474	$826,833	$984,191	$1,167,978	$1,382,063
-21%	$545,556	$655,708	$785,466	$937,869	$1,116,359	$1,324,827	$1,567,662
-20%	$617,842	$742,589	$889,540	$1,062,136	$1,264,275	$1,500,365	$1,775,375
-19%	$698,627	$839,685	$1,005,851	$1,201,014	$1,429,584	$1,696,543	$2,007,513
-18%	$788,788	$948,051	$1,135,660	$1,356,011	$1,614,078	$1,915,490	$2,266,591
-17%	$889,278	$1,068,831	$1,280,342	$1,528,764	$1,819,710	$2,159,521	$2,555,351

Annual Miner Efficiency Gain	Initial Hash Rate Growth 32.5%	35.0%	37.5%	40.0%	42.5%	45.0%	47.5%
-23%	16.4%	18.6%	20.8%	22.9%	25.1%	27.2%	29.4%
-22%	17.9%	20.1%	22.3%	24.5%	26.7%	28.9%	31.1%
-21%	19.4%	21.6%	23.9%	26.1%	28.3%	30.5%	32.7%
-20%	20.9%	23.2%	25.4%	27.7%	29.9%	32.1%	34.4%
-19%	22.4%	24.7%	27.0%	29.2%	31.5%	33.8%	36.1%
-18%	23.9%	26.2%	28.5%	30.8%	33.1%	35.4%	37.7%
-17%	25.4%	27.7%	30.1%	32.4%	34.7%	37.0%	39.4%

Source: CF Benchmarks, as of 11/30/2025

Our Bitcoin valuation framework employs a comparative market capitalization approach that projects Bitcoin's price by estimating its future market cap relative to gold. Practitioners can implement this methodology in three ways: First, assume Bitcoin captures a percentage of gold's market cap while gold continues growing at its historical rate (10.2% annually based on 20-year averages). Second, apply cannibalization adjustments that reduce gold's growth rate proportionally as Bitcoin gains market share, reflecting competitive dynamics within the store-of-value category. Third, establish a fixed relationship where Bitcoin reaches a target percentage of gold's current market cap, effectively holding gold's valuation constant. Each approach requires explicit assumptions about monetary expansion, inflation hedging demand, and capital flow dynamics between the two assets.

Tactical Model Framework: Macro Relationships and Policy Transmission

Monetary Policy Sensitivity Analysis

Bitcoin exhibits a strong relationship with global monetary conditions. Since 2015, the asset has maintained a correlation of 0.67 with changes in global M2 money supply on a three-month lag. This positive correlation indicates that Bitcoin's price responds systematically to global monetary expansion, though with a delay as market participants gradually price in liquidity changes.

Table 1 illustrates this relationship across multiple timeframes, demonstrating how Bitcoin's price tends to adjust following shifts in global M2. The three-month lag suggests that Bitcoin's response to monetary policy changes is not immediate but follows a predictable pattern as liquidity flows through financial markets. This relationship provides a quantitative foundation for tactical positioning around central bank policy shifts and changes in global liquidity conditions.

Table 1: Relationship Between Bitcoin and M2

Timeframe	Average BTC Change	Average M2 Change	Factor (BTC/M2)
1m	5.55%	.45%	12.2
3m	21.9%	1.43%	15.3

Source: CF Benchmarks, Bloomberg, as of 6/30/2025

The key insight from this relationship is that Bitcoin tends to appreciate at multiples of M2 growth due to its fixed supply of 21 million coins. As a scarce asset responding to increasing monetary supply, Bitcoin demonstrates asymmetric returns relative to fiat currency expansion. Looking forward, investor demand for non-sovereign stores of value such as Bitcoin is likely to increase as market participants seek protection from currency debasement.

Fair Value Estimation Using M2 Regression

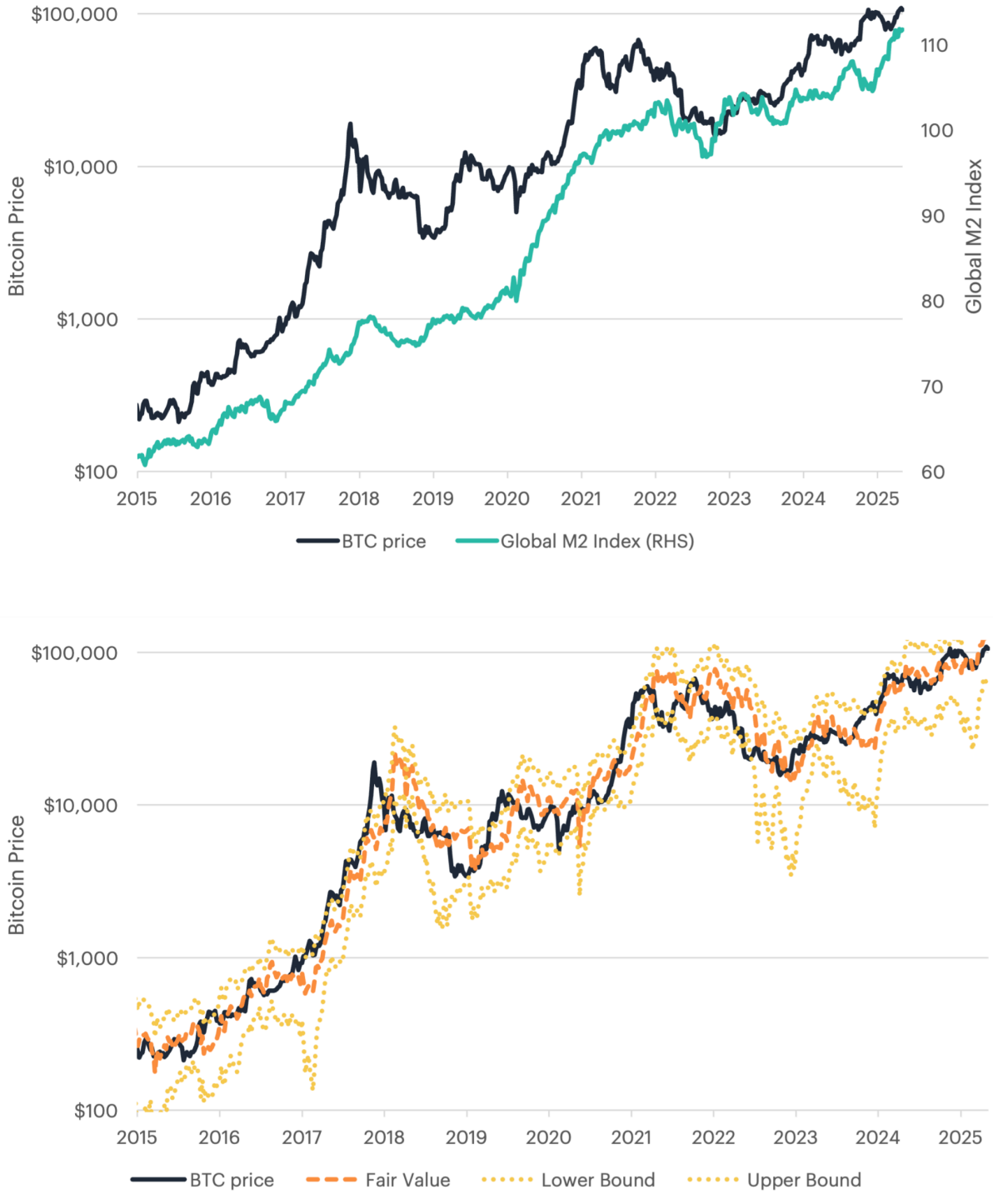
To identify Bitcoin's fair value in the near term, we employ a linear regression model in which Bitcoin's price is regressed against the three-month change in global M2. This model estimates Bitcoin's fair value based on current monetary supply conditions. By constructing a 95%

confidence interval around the regression line, we establish upper and lower price bounds that provide a statistically grounded methodology for identifying tactical entry and exit points.

Tactical Application

Historically, when Bitcoin's market price has fallen to the lower bound of the 95 percent confidence interval, it has represented a materially favorable accumulation window. Out of 586 weekly observations, 28 instances met this criterion, and these points generated meaningfully stronger short-term forward returns than the sample as a whole. When Bitcoin traded within 5 percent of the lower bound, the average 3-month forward return was 31.1 percent, compared with 21.0 percent across all periods. The effect was even more pronounced over 6 months, where the average return rose to 67.0%, versus 51.9% for the full sample. Although 12-month returns were more variable and less conclusive, the short- and intermediate-term patterns suggest that lower-bound readings have historically aligned with advantageous tactical entry points. Conversely, when prices extend materially toward the upper bound of the fair-value range, Bitcoin may be temporarily overvalued relative to underlying liquidity conditions. This regression-based framework therefore provides both a strategic and tactical lens for assessing valuation relative to global monetary dynamics.

Figure 11: Bitcoin Fair Value and Tactical Signals Based on Global M2

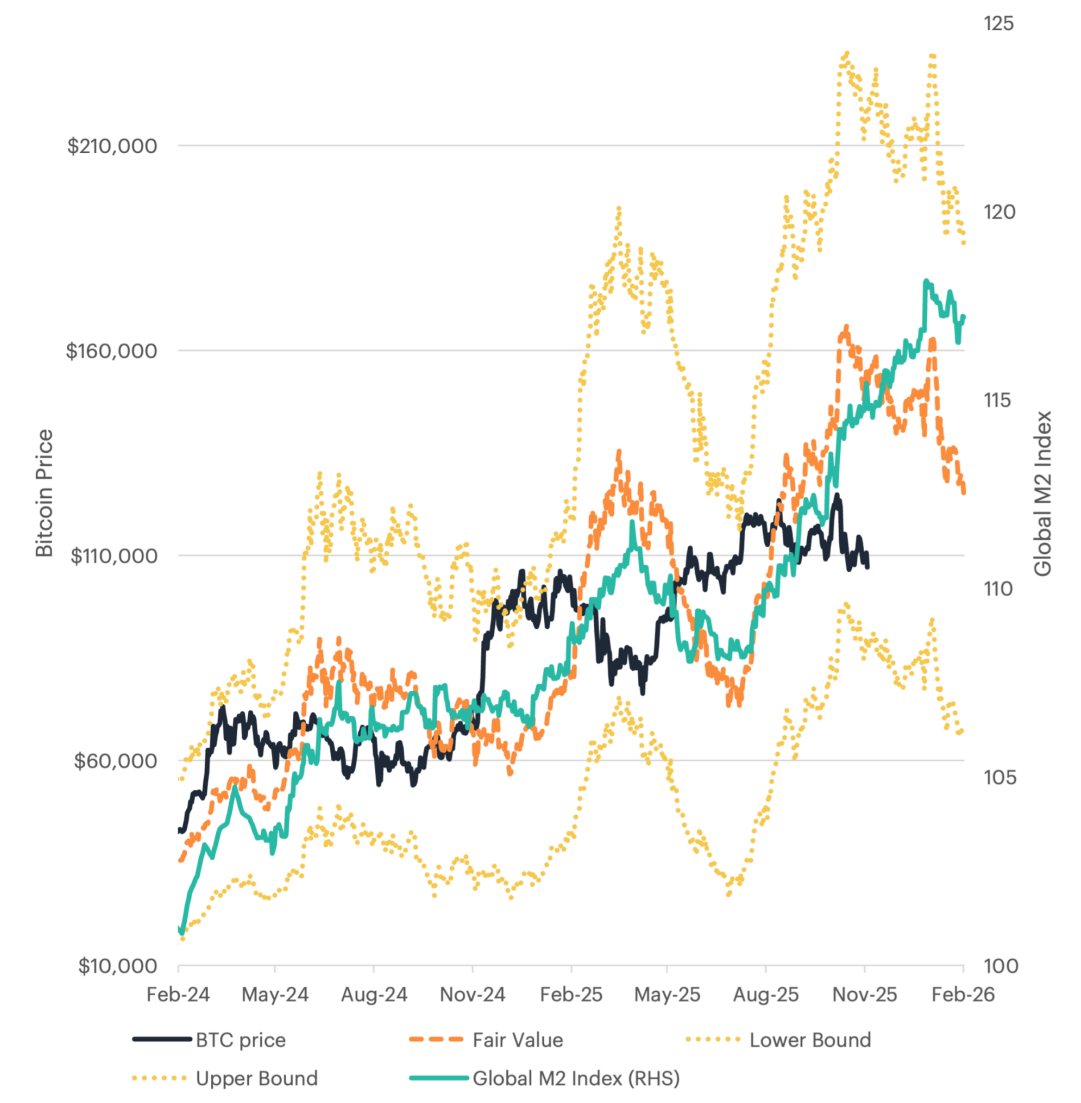


Source: CF Benchmarks, Bloomberg as of 06/30/2025

Integrated Valuation Framework

When combined with the comparative value and cost-of-production models, this monetary analysis provides a complementary macroeconomic perspective for assessing Bitcoin's long-term potential. Together, these three frameworks integrate monetary expansion dynamics, production economics, and relative market positioning to form a comprehensive, multi-factor approach to Bitcoin valuation and strategic allocation.

Figure 12: Forward-Looking Bitcoin and Global M2 Tactical Allocation Model



Source: CF Benchmarks, as of 10/31/2025

II. Risk Framework: Volatility Compression and Correlation Dynamics

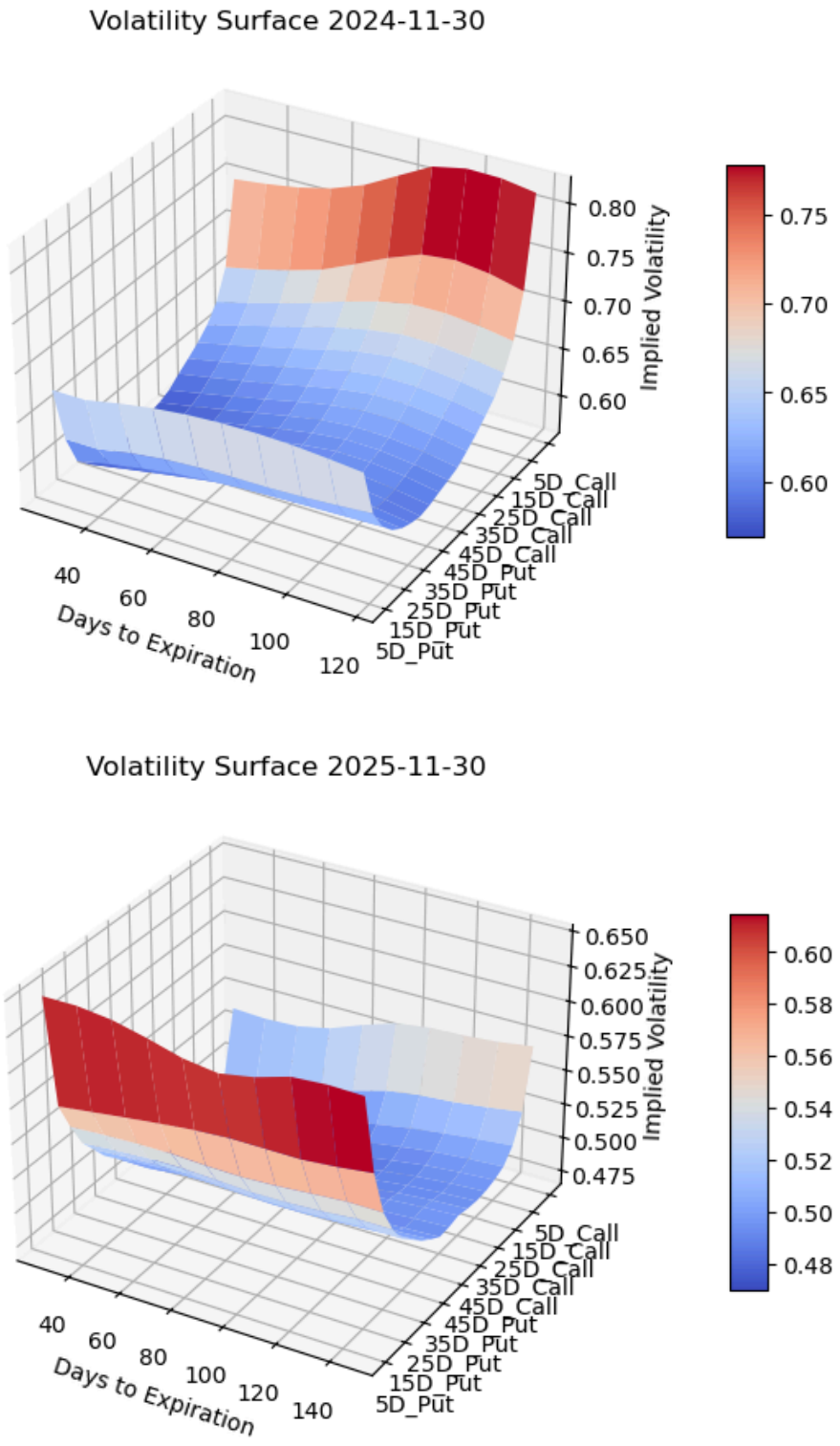
Institutional Maturation Evidence

Statistical evidence indicates that Bitcoin's market volatility has compressed meaningfully as the asset has matured. Annualized volatility, which exceeded 100% during Bitcoin's early trading years, has declined into the 30% to 40% range in recent periods. This compression reflects more efficient price discovery, broader market participation, and growing institutional involvement.

An examination of CME Bitcoin options data demonstrates how institutional participation has reshaped the volatility term structure, which represents the pattern of implied volatility across option maturities. Long-dated implied volatility has declined substantially, driven in part by the increased use of covered call strategies. These strategies generate income by selling call options against Bitcoin holdings and have systematically reduced option premiums across the curve as institutions harvest volatility risk premia.

At the same time, short-dated put volatility has increased, mirroring behavior observed in mature asset classes such as equity options. This shift signals more sophisticated risk management practices, with investors employing short-term put options for tactical downside protection during periods of heightened uncertainty.

Figure 13: CME Bitcoin Options Volatility Surface 12-Month Comparison



Source: CF Benchmarks, as of 11/30/2025

Price–Volatility Relationship Inversion

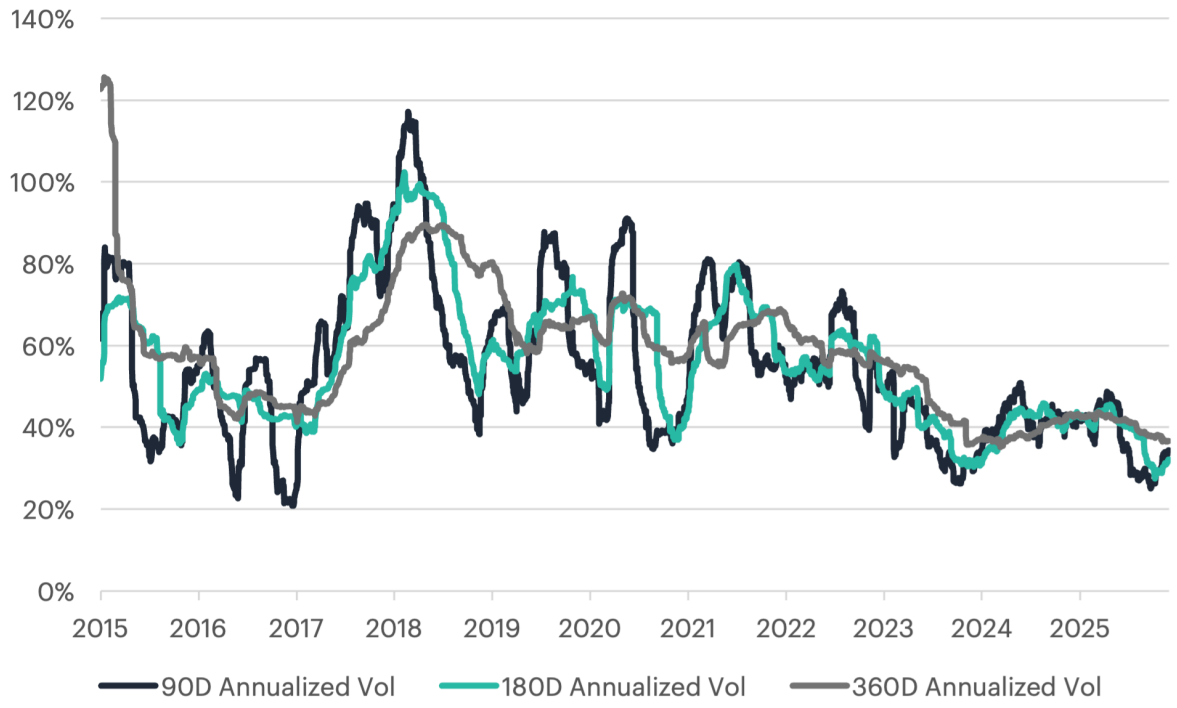
A notable structural change has also emerged in the relationship between Bitcoin's price and its volatility. Historically, Bitcoin experienced rising volatility during price rallies, reflecting speculative positioning and leveraged activity. Following the launch of spot Bitcoin ETFs in early 2024, this relationship has inverted: prices have increased while volatility has continued to decline. This inverse pattern is characteristic of developed financial markets, where rising prices often coincide with improved liquidity and reduced uncertainty.

To quantify the long-term trend, we analyzed Bitcoin's 90-day, 180-day, and 360-day annualized volatility from 2014 through 2024. The results show a consistent downward trajectory across all horizons, illustrating sustained volatility compression as market infrastructure, liquidity, and institutional participation have expanded. These findings are consistent with the maturation of an emerging asset transitioning toward mainstream adoption and deeper integration into global portfolios.

Forward Volatility Projections

To project future volatility, we assume that Bitcoin's volatility will continue to decline but at a slower pace than observed over the past decade. Our two-stage modeling approach applies a decline rate equal to half of the historical pace over the next five years (-3.5%), resulting in a projected volatility of 30.6% by 2030. Over the subsequent five years, the rate of decay is reduced by half again (-1.75%), leading to a projected volatility of approximately 28.0% by 2035. This approach reflects the expectation that volatility compression will persist as the market continues to mature, albeit with diminishing marginal effects.

Figure 14: Bitcoin Annualized Volatility



Source: Bloomberg, as of 11/30/2025

Dynamic Correlation Patterns

Bitcoin's correlation profile with traditional asset classes has continued to evolve as the market has matured and institutional participation has increased. A cross-asset weekly correlation matrix over the last ten years shows that Bitcoin maintains a low correlation to most equity indices, with correlations of 0.20 with the S&P 500, 0.21 with the Nasdaq 100, 0.18 with MSCI Europe, 0.12 with MSCI Japan, and 0.15 with MSCI Emerging Markets. These figures indicate that while Bitcoin is increasingly influenced by broader risk-asset sentiment, it remains far less tightly synchronized with global equities than those indices are with each other. Correlations with fixed income are negligible; Bitcoin shows a –0.01 correlation with the U.S. 2-Year Treasury yield, effectively zero (–0.00) with the U.S. 10-Year Treasury yield, and only 0.11 with global bonds, which suggests it continues to behave independently of interest-rate dynamics and duration-sensitive assets. Correlations with alternative assets are similarly modest, including 0.14 with gold and 0.09 with crude oil, reinforcing the view that Bitcoin does not function as a

traditional store of value or commodity. Taken together, the current correlation structure supports Bitcoin's role as a distinct and diversifying asset class, exhibiting gradually rising but still moderate linkages to equities and persistently low connections to bonds and real assets.

Figure 15: Bitcoin 10Y Weekly Correlation Matrix

Source: Bloomberg, as of 11/30/2025

Over the last several years, Bitcoin's correlations with traditional asset classes have shown meaningful time variation, reflecting shifting macro conditions and a growing investor base. Since 2020, Bitcoin's correlation with global equities has trended higher, at times reaching levels between 0.4 and 0.6, before easing during risk-off periods and then rising again more recently. This pattern highlights Bitcoin's increasing sensitivity to broad risk sentiment and liquidity conditions, particularly as investors have incorporated it alongside growth-oriented equities. In contrast, correlations with global bonds have remained low and often negative, aside from brief spikes during periods of acute market stress, indicating that Bitcoin continues to behave independently of duration sensitive assets. Correlations with commodities and real estate have also fluctuated within a modest range, generally oscillating between slightly negative and moderately positive levels, while the relationship with gold has moved episodically but remained structurally weak. Taken together, the time-series evidence illustrates that Bitcoin's most durable and strengthening linkage is with global equities, whereas its connections to bonds, commodities, gold, and real assets remain inconsistent and comparatively muted.

Forward-Looking Correlation Assumptions

Our long-term correlation modeling reflects a combination of current market dynamics, Kalman-filter projections, and practitioner judgment, serving as a flexible guide rather than prescriptive assumptions. Bitcoin's current correlation with global equities stands at 0.52, while

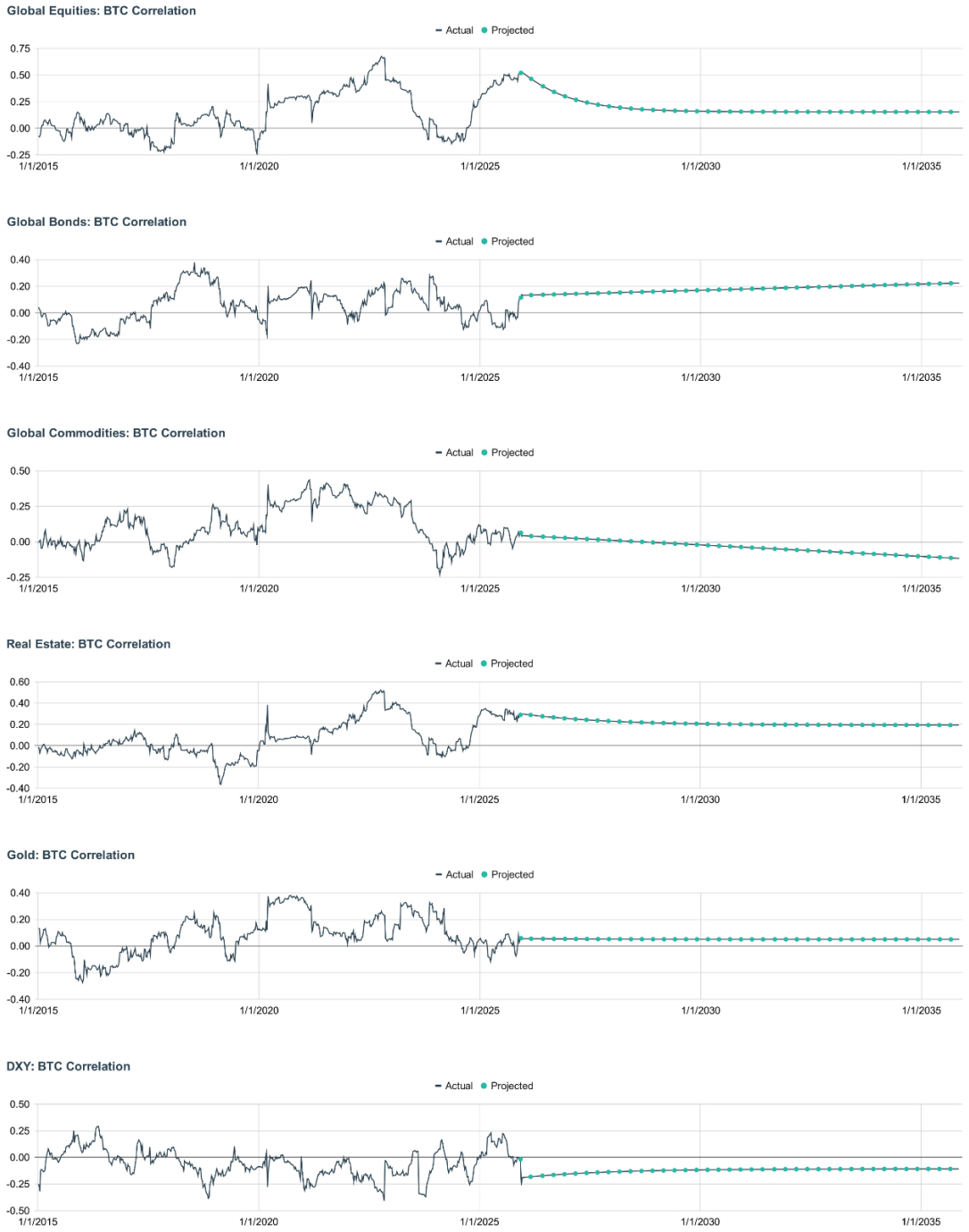
our 10-year projection declines to 0.15, consistent with mean reversion as Bitcoin's investor base broadens and recent liquidity-driven effects moderate. We expect Bitcoin's equity correlation to normalize over time, though practitioners may reasonably apply alternative assumptions based on their views regarding institutional adoption and risk-asset integration.

Bitcoin's correlation with global bonds currently measures 0.14, with Kalman-filter projections indicating an increase to 0.22 over the next decade. While this suggests occasional co-movement during certain macro regimes, we continue to view Bitcoin as largely independent of traditional interest rate cycles. Practitioners may apply lower or higher assumptions depending on their macro framework. With respect to commodities, Bitcoin's correlation remains low at 0.04 and is projected to decline to –0.12, reflecting Bitcoin's distinct macro drivers and lack of exposure to physical supply-demand dynamics.

Bitcoin's correlation with real estate currently stands at 0.30 and is expected to decline toward 0.19, reflecting normalization toward its long-term mean while remaining modestly positive due to shared sensitivity to fiat debasement. Bitcoin's correlation with gold currently measures 0.06 and is expected to remain near zero over the long run, consistent with their divergent roles as digital and traditional stores of value. Bitcoin's correlation with the U.S. dollar currently measures –0.26 and is projected to remain modestly negative at –0.11, as weaker dollar regimes have historically supported Bitcoin returns.

These projections suggest that Bitcoin will likely maintain structurally low correlations across most major asset classes, reinforcing its diversification potential within multi-asset portfolios while retaining moderate sensitivity to global equity risk and macro-liquidity conditions. Practitioners should treat these assumptions as a baseline framework and adjust them based on differentiated views of Bitcoin's evolving role within the global financial system.

Figure 16: Bitcoin Rolling Weekly Correlations



Source: CF Benchmarks, Bloomberg, as of 11/30/2025

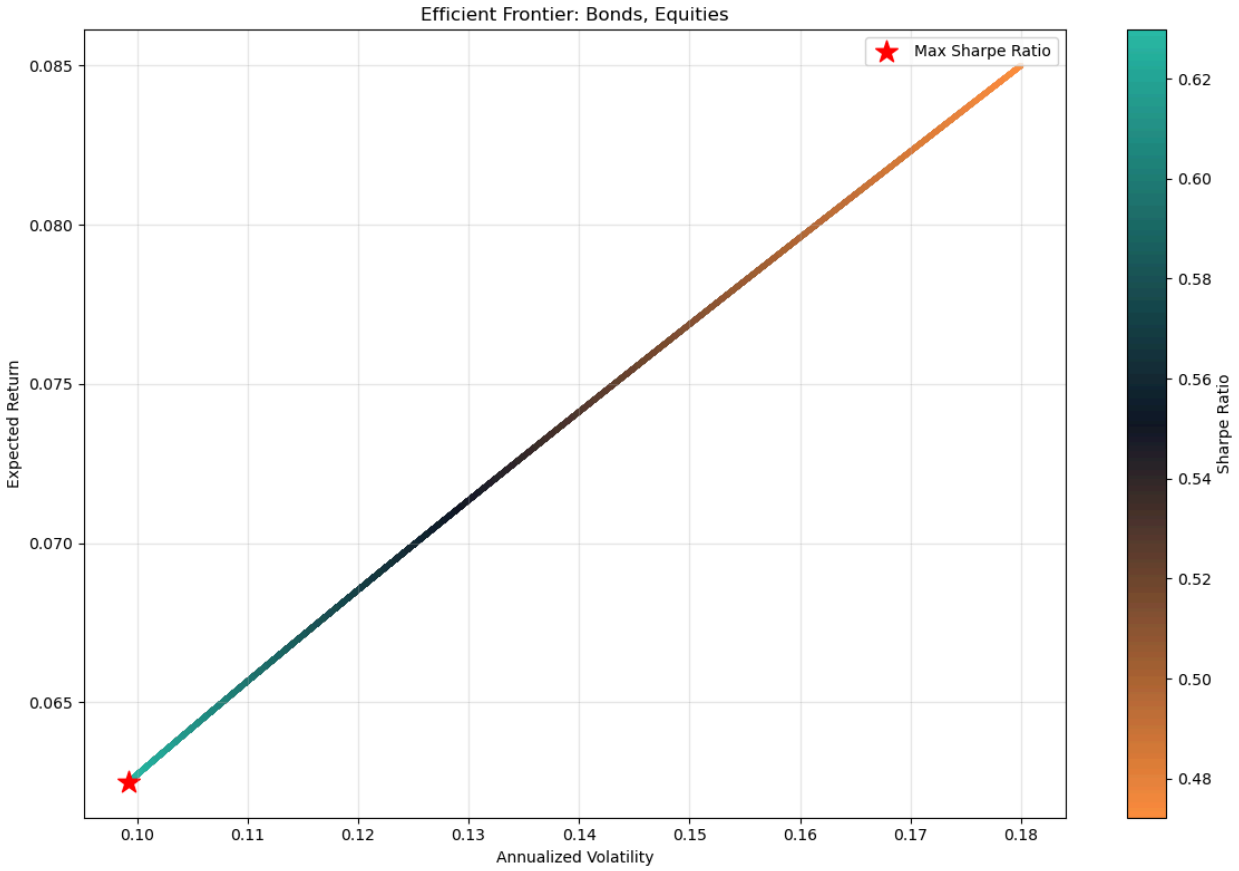
III. Implementation Strategy and Portfolio Construction

Portfolio Construction Implications and Sizing Methodology

Using our capital market assumptions, the portfolio implications of introducing Bitcoin into a traditional 60/40 allocation are material. Our analysis evaluates three asset classes using the following baseline assumptions: equities with a 9.5% expected return and 15% volatility, bonds with a 3.0% expected return and 7% volatility, and Bitcoin with a 30.1% expected return and 28.0% volatility. These inputs reflect the long-term return, risk, and correlation dynamics developed earlier in the report.

As a baseline, the minimum-variance portfolio constructed using only equities and bonds allocates 55% to equities and 45% to bonds, producing an expected return of 6.39% with 9.53% volatility. This two-asset portfolio serves as a reference point for assessing Bitcoin's incremental contribution to portfolio efficiency.

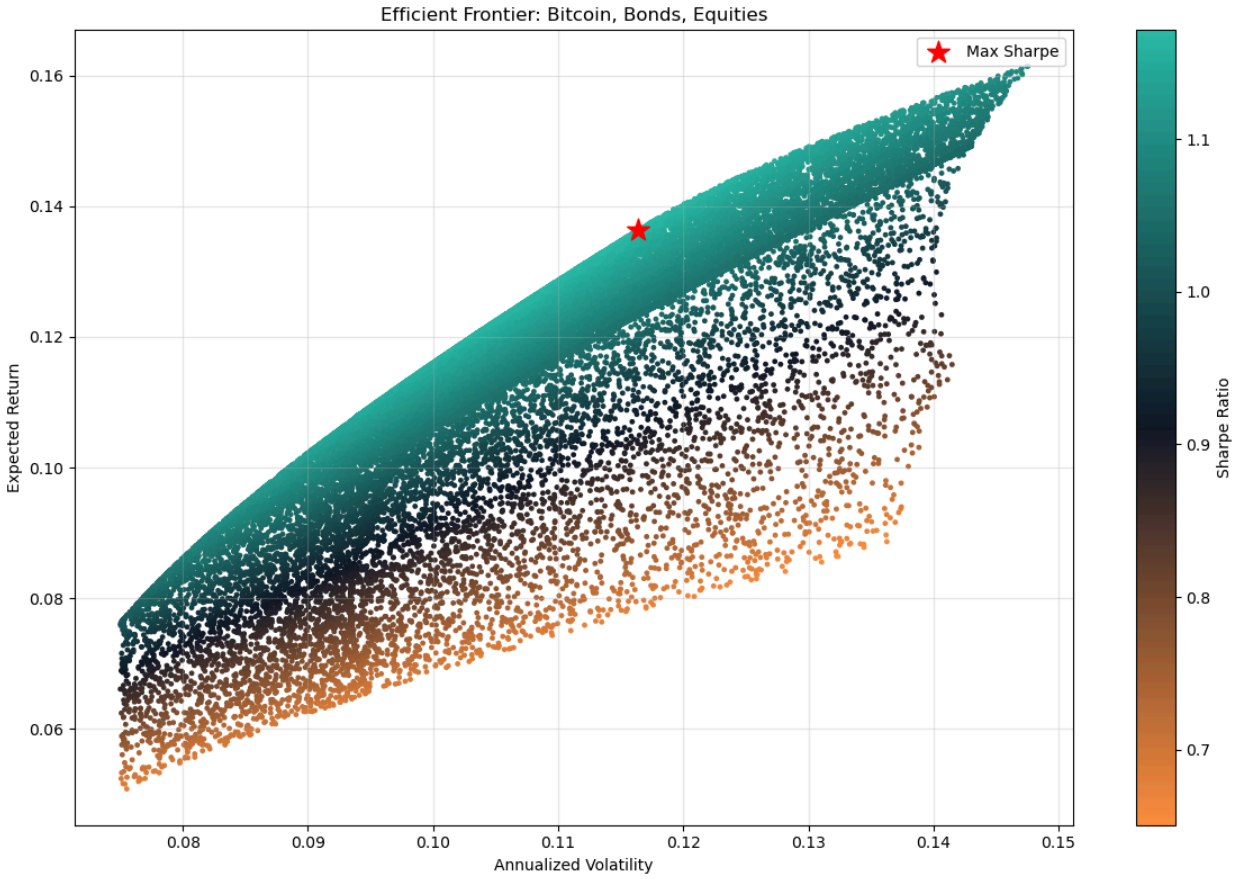
Figure 17: Efficient Frontier: Bonds, Equities



Source: CF Benchmarks, Bloomberg, BlackRock, as of 11/30/2025

When Bitcoin is introduced without allocation constraints, the maximum-Sharpe portfolio shifts materially toward higher-growth assets. The optimizer allocates 33.0% to Bitcoin, 39.0% to bonds, and 28.0% to equities. This three-asset portfolio delivers a 13.6% expected return with 11.6% volatility, more than doubling returns relative to the traditional two-asset portfolio while adding only 2.1 percentage points of volatility.

Figure 18: Efficient Frontier: Bitcoin, Bonds, Equities (No Constraints)

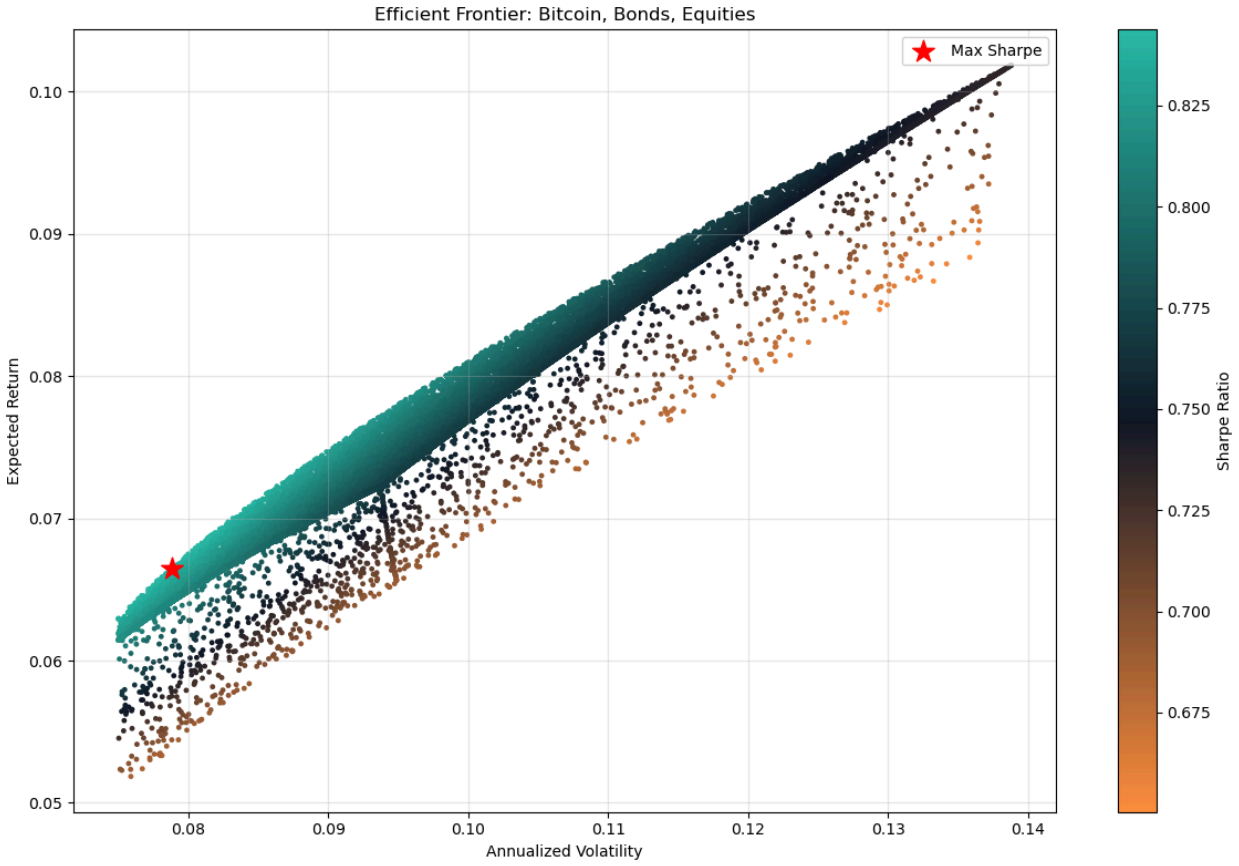


Source: CF Benchmarks, Bloomberg, BlackRock, as of 11/30/2025

Applying a more realistic 5% cap on Bitcoin produces a portfolio of 5% Bitcoin, 35.6% equities, and 59.4% bonds. This constrained allocation improves the expected return to 6.7% while reducing expected volatility to 7.9%—delivering higher returns at lower risk than the traditional two-asset portfolio.

This outcome validates the broader findings across our correlation and long-term modeling work: Bitcoin's combination of high expected returns, moderate long-term volatility, and structurally low correlations with both equities and bonds enhances portfolio efficiency even at small allocation sizes. The result is a portfolio that achieves higher return potential with lower overall risk.

Figure 19: Efficient Frontier: Bitcoin, Bonds, Equities (5% Bitcoin Cap)



Source: CF Benchmarks, Bloomberg, BlackRock, as of 11/30/2025

IV. Conclusion: The Strategic Allocation Imperative

Practitioners can apply a multi-model framework for capital market assumptions that integrates comparative valuation, production economics, and monetary-liquidity dynamics. Together, these approaches suggest that Bitcoin's long-term value is supported by its growing share of the global store-of-value market, the structural linkage between market price and production cost, and its sensitivity to global money-supply trends. As institutional participation deepens, volatility is likely to continue compressing, while Bitcoin's exposure to monetary debasement supports persistently low correlations to most major asset classes, enhancing portfolio diversification.

Improving regulatory clarity, rising institutional acceptance, and deepening spot and derivatives liquidity continue to strengthen Bitcoin's investability. Applying the valuation frameworks outlined above, we derive the following long-term price outcomes for Bitcoin by 2035, reflecting differing adoption paths within the store-of-value market.

- **Base Case – $1.42 million by 2035 (Probability-Weighted):** The base case reflects a probability-weighted blend of adoption scenarios, assigning a 60% probability to double-trend growth, 20% to trend continuation, and 10% each to parity with gold and outperformance. This framework implies Bitcoin captures approximately 33% of gold's market capitalization, producing a price target of $1.42 million and an expected annualized return of 30.1%.

- **Bear Case – $637,000 by 2035:** Bitcoin captures store-of-value market share at its historical trend rate, reaching approximately 16% of gold's market capitalization amid slower but sustained adoption.

- **Bull Case – $2.95 million by 2035:** Bitcoin becomes the dominant global store of value, absorbing investment flows from gold and reaching roughly 125% of its market capitalization, driven by accelerated institutional and sovereign adoption.

Across scenarios, a strategic allocation of 2-5% improves portfolio efficiency meaningfully. In our simulations, Bitcoin's high expected returns, declining volatility, and low correlations with equities and bonds expanded the efficient frontier, enabling higher return targets at comparable or lower levels of risk. Institutions that develop robust capital market assumptions for Bitcoin will be better positioned to size, rebalance, and manage exposure as the asset class continues to mature.

V. 2026 Capital Market Assumptions

	Assumption
10-Year Price Target	$1,415,730
10-Year Annualized Return	30.1%
10-Year Volatility	28.0%
Correlation to Global Equities	0.15
Correlation to Global Bonds	0.22
Correlation to Commodities	-0.12
Correlation to Real Estate	0.19
Correlation to Gold	0.05
Correlation to US Dollar	-0.11

10-Year Price Target Breakdown:

Model	2035 Target Price	Annualized Return	Probability
Current Trend	$636,643	21.3%	20%
Double Trend Growth	$1,260,159	29.9%	60%
Equal to Gold	$2,365,806	38.3%	10%
Multiple of Gold	$2,957,257	41.4%	10%
Probability Weighted Price Target	**$1,415,730**	**30.1%**	
Current Price as of 11/30/25	**$92,396**		

Comparative Market Cap Analysis Assumptions:

Model	10Y Gold Return Assumption	10-Year Target Market Cap Ratio	Current Gold/BTC Market Cap	Terminal BTC supply
Current Trend	10.5%	16.8%	7.9%	20,775,739
Double Trend Growth	10.5%	33.2%	7.9%	20,775,739
Equal to Gold	5.75%	100%	7.9%	20,775,739
Multiple of Gold	5.75%	125%	7.9%	20,775,739

Cost of Production Model Assumptions:

	Assumption
Electric Cost	.05
Electric Cost Inflation	3%
Initial Hashrate Growth	40%
Terminal Hashrate Growth	24.7%
Efficiency Gain	19.8%
Starting Hashrate (EH)	1,239
Starting Efficiency (W/TH)	25.7
Starting Block Reward	3.125
Halving Dates	3/31/2028, 3/31/2032

Bitcoin's Returns At the Lower Bound of the Tactical Fair Value Model:

	Average When BTC is within 5% of Lower Bound (2015-2025, 28 Observations)	Average During Sample Period (2015-2025)
90 Day Return	31.3%	21.0%
180 Day Return	67.0%	51.9%

Bitcoin's Historical Volatility:

	Beginning Value (January 2015)	Ending Value (November 2025)	Annualized Decline
90 Day Annualized Volatility	62.2%	34.4%	-6.4%
180 Day Annualized Volatility	51.8%	32.1%	-7.4%
360 Day Annualized Volatility	122.7%	36.7%	-7.0%

Monte Carlo Simulation Assumptions:

	Bitcoin	Equities	Bonds
Expected Return	30.1%	9.5%	3%
Expected Volatility	28.0%	15%	7%

Glossary of Terms

Annualized return - A return expressed on a per-year basis, even if measured over shorter or longer horizons.

Annualized volatility - A yearly-scaled measure of variability in returns (risk), typically derived from return fluctuations.

ASIC (Application-Specific Integrated Circuit) - Specialized mining hardware designed to compute Bitcoin's hashing function efficiently.

ASIC efficiency (W/TH) - Miner power consumption measured as watts per terahash; lower values indicate higher efficiency.

Asymmetrical return distribution - A return profile where upside outcomes are larger or more frequent than downside outcomes (often associated with positive skew).

Bitcoin issuance - The flow of new Bitcoin created via block rewards (new supply entering the market).

Block reward - The amount of Bitcoin paid to miners for adding a block to the blockchain; it declines at each halving.

Cannibalization factor (CF) - An adjustment that reduces gold's assumed growth rate in scenarios where Bitcoin takes meaningful store-of-value share from gold.

Capital market assumptions (CMAs) - Forward-looking estimates of expected returns, volatilities, and correlations used for strategic portfolio construction.

Comparative market capitalization valuation - A valuation approach that estimates Bitcoin's future price by projecting Bitcoin's market cap relative to gold and the broader store-of-value market.

Confidence interval (CI) - A statistically derived range around an estimate (for example, regression fair value) that reflects uncertainty in the estimate.

Cost of production (Bitcoin) - An estimate of the all-in economic cost to produce one Bitcoin, driven by hashrate, miner efficiency, electricity cost, and issuance.

Covered call - An options strategy where an investor sells call options against an existing holding to generate income (often described as harvesting volatility risk premia).

Difficulty (mining difficulty) - A protocol parameter that adjusts to keep block production near a target pace; rising difficulty generally increases the work or energy required to mine.

Efficient frontier - The set of portfolios that offer the highest expected return for each level of expected risk (volatility).

Electricity cost (P_{Energy}) - The assumed average cost of power used to translate energy consumption into dollar production cost (often expressed per kWh or MWh).

Energy consumption (network) - Total electricity implied by network hashrate and average miner efficiency.

Global M2 - A broad measure of money supply (cash, deposits, and near-money) aggregated across major economies; used as a proxy for global liquidity conditions.

Hashrate - Total computational power securing the Bitcoin network; higher hashrate generally implies higher security and usually higher energy use.

Issuance (in production-cost formula) - Daily block rewards used when converting network energy use into cost per Bitcoin mined.

Kalman filter - A statistical method that estimates a time-varying state (for example, dynamic correlation) by blending prior estimates with new observed data.

Liquidity - How easily an asset can be traded without materially moving its price; deeper liquidity generally reduces volatility and slippage.

Market capitalization (market cap) - Asset price multiplied by circulating supply.

Median and quartiles (return distribution) - Summary statistics for returns: the median is the midpoint; quartiles split outcomes into four equal-frequency buckets.

Minimum-variance portfolio - The portfolio mix with the lowest expected volatility for a given set of assets and assumptions.

Monte Carlo simulation - A technique that generates many simulated future paths using assumed returns, volatilities, and correlations to evaluate a range of outcomes.

Price floor (production economics) - The idea that production cost can act as support, since prices far below cost may reduce supply pressure (for example, via miner shutdowns).

Sharpe ratio - Risk-adjusted return measure: (expected return minus risk-free rate) divided by volatility.

Store-of-value - Assets primarily held to preserve wealth (for example, gold; and in this paper's framework Bitcoin).

Strategic horizon - Long-term allocation and assumptions (multi-year).

Tactical horizon - Shorter-term positioning guided by valuation bands, macro and liquidity regimes, and policy transmission.

Terminal BTC supply - The assumed total Bitcoin supply at the forecast horizon, used to translate projected market cap into per-coin price.

Volatility compression - A structural decline in volatility over time as markets mature, liquidity deepens, and participation broadens.

Volatility risk premium - The tendency for implied volatility to exceed realized volatility over time; can be harvested by option-selling strategies (with risk).

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