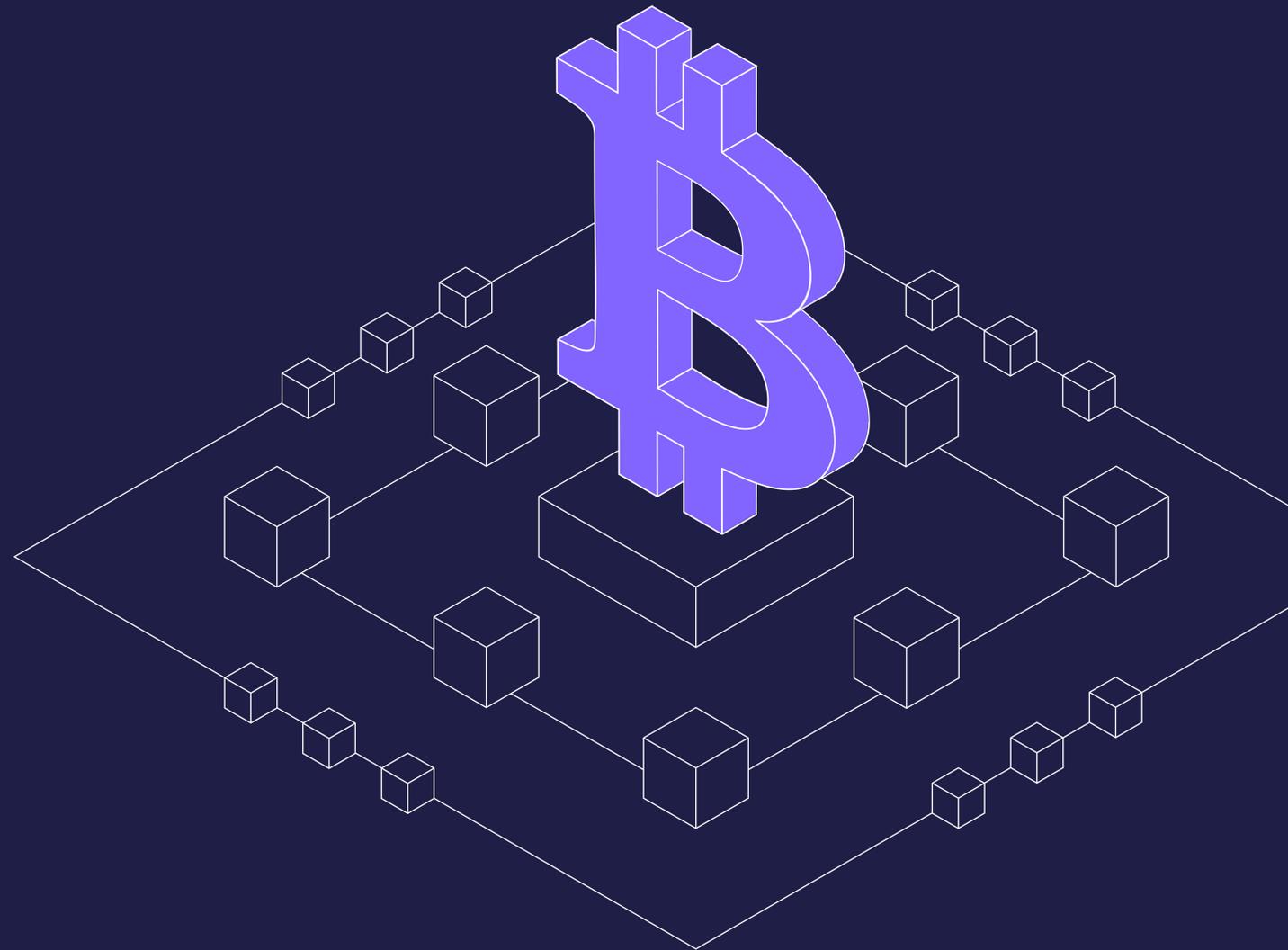


December 2024

THE BITCOIN MONTHLY

INTO 2025



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PAST PERFORMANCE IS NOT INDICATIVE OF FUTURE PERFORMANCE; FUTURE RETURNS ARE NOT GUARANTEED.



Important Information Regarding Bitcoin

Bitcoin is a relatively new asset class, and the market for bitcoin is subject to rapid changes and uncertainty. Bitcoin is largely unregulated and bitcoin investments may be more susceptible to fraud and manipulation than more regulated investments. Bitcoin is subject to unique and substantial risks, including significant price volatility and lack of liquidity, and theft.

Bitcoin is subject to rapid price swings, including as a result of actions and statements by influencers and the media, changes in the supply of and demand for bitcoin, and other factors. There is no assurance that bitcoin will maintain its value over the long term.

ARK strongly encourages any investor considering an investment in bitcoin or any other digital asset to consult with a financial professional before investing. All statements made regarding bitcoin are strictly beliefs and points of view held by ARK and are not recommendations by ARK to buy, sell or hold bitcoin. Historical results are not indications of future results.



SECTIONS

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Appendix: Glossary Of Terms



Section 01

Market Summary





Bitcoin And Macro Dynamics Look Good For 2025

Looking Toward A Positive 2025

- During December, bitcoin's price dropped 3.2% to \$93,354—its first down month in over a quarter.
- The bitcoin price closed above its 200-day moving average, its short-term-holder (STH) cost basis, and its on-chain mean at \$72,501, \$87,751, and \$61,110, respectively.
- Historically, all years following a halving year have delivered positive returns and bullish momentum. The last halving occurred in 2024.
- Suggesting strong holder behavior, 62% of bitcoin's supply has not moved in more than a year.
- Significant short liquidations in the futures market suggest short-term overheated conditions in the bitcoin market.

Productivity Driving Economic Growth

- The metals-gold ratio has hit a historically low level, signaling lower rates and/or higher metals prices.
- Small business optimism increased significantly after the election.
- Productivity—enabled by AI—could turbocharge growth in Real Gross Domestic Product.

ARK'S KEY TAKEAWAYS

- During December, bitcoin's price dropped 3.2% to \$93,354.
- All post-halving years have ended with positive returns. 2025 is a post-halving year.
- Strong long-term holding behavior is balanced by short-term overheating in the derivatives market.
- Shifting macro signals, renewed small business optimism, and rising AI-driven productivity are shaping economic growth.



News Of The Month

[MARA Proposes \\$700 Million Convertible Senior Note Offering To Buy More Bitcoin](#)

[Trump Taps Paul Atkins for Next SEC Chair](#)

[Trump Appoints Former PayPal Exec David Sacks As AI And Crypto Czar](#)

[El Salvador To Change Bitcoin Law As Part Of New IMF Deal](#)

[Ripple Secures NYDFS Approval For RLUSD Stablecoin, Aiming For \\$2 Trillion Market Cap By 2028](#)

[Texas House Introduces Bill To Establish A Strategic Bitcoin Reserve](#)

[Bitcoin Proxy MicroStrategy To Join The Nasdaq 100 And Heavily Traded 'QQQ' ETF](#)



On-Chain Health Is Net Neutral

	Bitcoin Metrics ¹	Unit	December 2024	1M Change	1Y Change	ARK's View	Upgrade/Downgrade ³
Network Security	<u>Mining Difficulty</u>	Exahash/SEC ¹ (Thousands)	471.5	+7.3%	+52.4%	Bullish	No Change
	<u>Miner Revenue</u> (7-Day Moving Average)	USD (Millions)	44.3	+0.76%	-8.2%	Neutral	↓
Network Usage	<u>Active Owners</u> ² (Active Entities, 7-Day Moving Average)	Thousands	201.5	-15.3%	-0.21%	Bearish	↓
	<u>Transaction Volume</u> ² (7-Day Moving Average)	BTC (Thousands)	94.6	-36.2%	-13.3%	Bearish	↓↓
Holder Behavior	<u>Long-Term-Holder Supply</u> ² (Coins Held For 155 Days+)	BTC (Millions)	13.1	-3.9%	-8%	Bearish	No Change
	<u>Locked Supply</u> ² (Illiquid Supply)	BTC (Millions)	14.8	+1%	+3.5%	Bullish	No Change
	<u>Time-Weighted Turnover</u> ² (Coindays Destroyed, 7-Day Median)	Coindays (Millions)	13.8	-14.4%	+55.1%	Bullish	↑

[1] For more information on these metrics and their units of account, please read the Appendix: Glossary of Terms in the Appendix of this report. [2] Data may be subject to change over time since they are entity-adjusted in real time via a machine-learning algorithm. [3] Arrows displayed in the "Upgrade/Downgrade" column convey the change in our view of that metric compared to last month. For instance, if our view changes from bearish to neutral, the arrow will be green, and so forth. One arrow denotes a 1-tier change, and two arrows denote a 2-tier change. Source: ARK Investment Management LLC, 2024. Data sourced from Glassnode. Some data may be subject to change over time since they are entity-adjusted in real time. Information as of December 31, 2024. For informational purposes only and should not be considered investment advice or a recommendation to buy, sell, or hold any particular security or cryptocurrency.

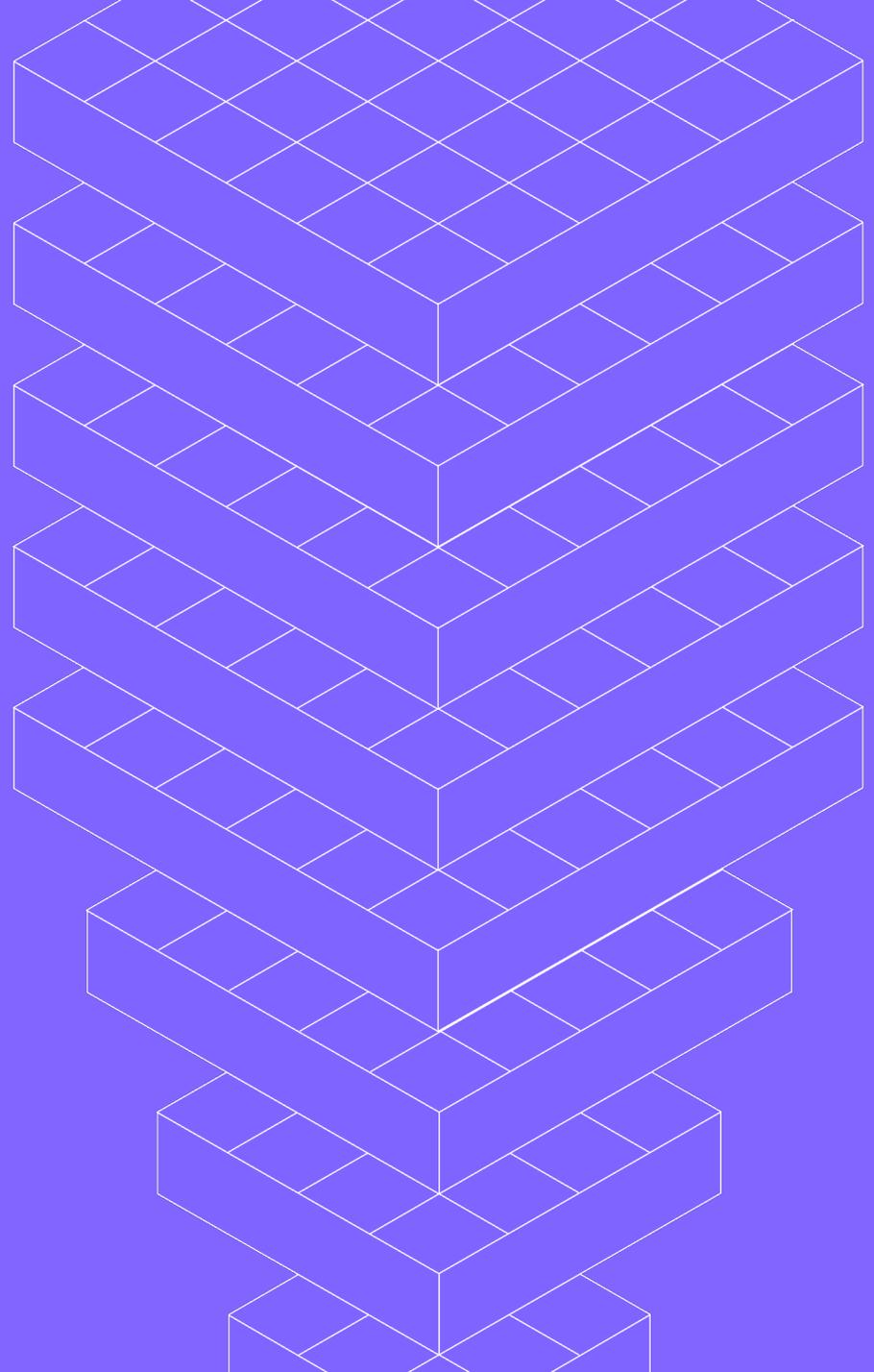


Cost Bases Continue To Increase, A Bullish Signal

	Bitcoin Metrics ¹	Unit	December 2024	1M Change	1Y Change	ARK's View	Upgrade/Downgrade ³
Long-Term Valuation	<u>Market Cost Basis</u> (Realized Price)	USD	\$40,986	+10.7%	+86.7%	Bullish	No Change
	<u>Percent Supply In Profit</u>	pp	84.7	-10.8	-5.15	Neutral	No Change
Short-Term Valuation	<u>Short-Term-Holder Cost Basis²</u> (STH Realized Price)	USD	\$86,964	+12.8%	+138.3%	Bullish	No Change
	<u>Realized Market Returns²</u> (SOPR-1, 7-Day Moving Average)	pp	18.4	+0.2	+6.7	Neutral	No Change
Market Sentiment	<u>Perpetual Futures Basis</u> (Binance, Estimated)	pp	-0.03	-0.1	-0.1	Bullish	↑↑
	<u>Expirational Futures Basis</u> (Quarterly, All Exchanges, Annualized)	pp	12.8	-2.9	-7.6	Bullish	↑

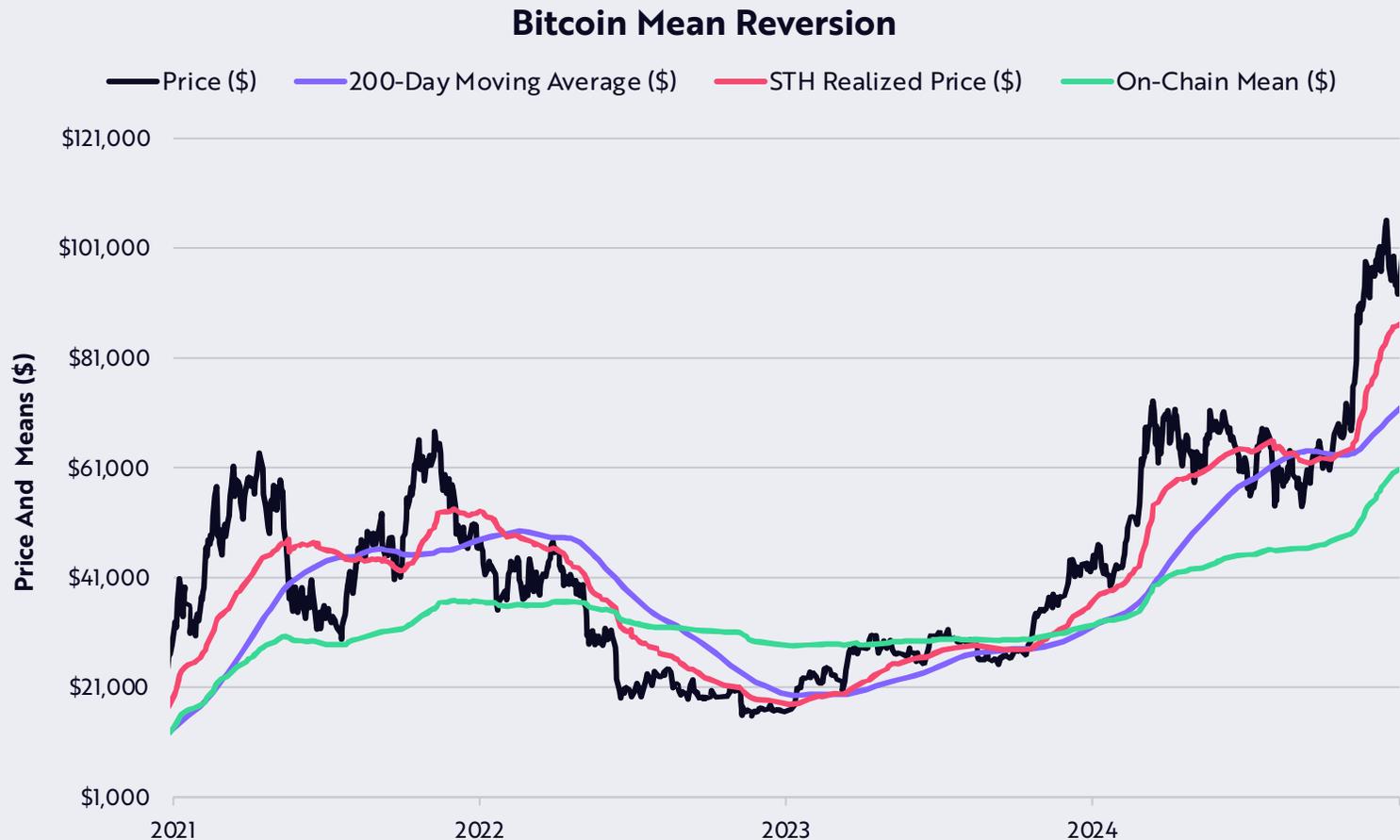
[1] For more information on these metrics and their units of account, please read the Appendix: Glossary of Terms in the Appendix of this report.. [2] Data may be subject to change over time since they are entity-adjusted in real time via a machine-learning algorithm. [3] Arrows displayed in the "Upgrade/Downgrade" column convey the change in our view of that metric compared to last month. For instance, if our view changes from bearish to neutral, the arrow will be green, and so forth. One arrow denotes a 1-tier change, and two arrows denote a 2-tier change. Source: ARK Investment Management LLC, 2024. Data sourced from Glassnode. Some data may be subject to change over time since they are entity-adjusted in real time. The perpetual futures basis was estimated internally on the basis of data from TradingView, and it is subject to change. Information as of December 31, 2024. For informational purposes only and should not be considered investment advice or a recommendation to buy, sell, or hold any particular security or cryptocurrency.

Looking Toward A Positive 2025





At The End Of 2024, Bitcoin Price Headed Back To Its Short-Term-Holder Cost Basis



ARK'S VIEW: BULLISH

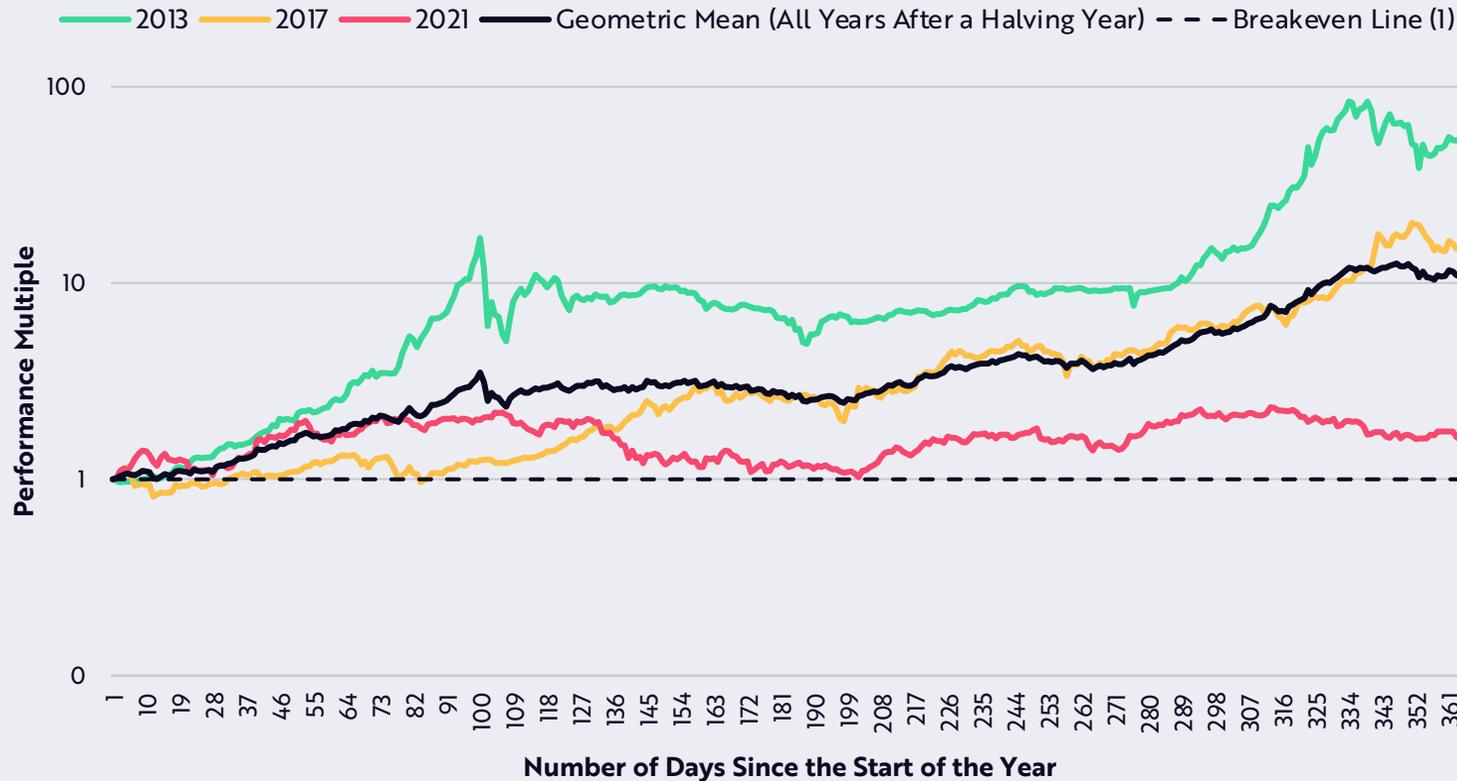
- During December, bitcoin's price dropped 3.2% to \$93,354—its first down month in over a quarter.
- The bitcoin price closed above its 200-day moving average, its short-term-holder (STH) cost basis, and its on-chain mean at \$72,501, \$87,751, and \$61,110, respectively.

Source: ARK Investment Management LLC, 2025. Chart data from Glassnode. Information as of December 31, 2024. STH realized price data may be subject to change over time since they are entity-adjusted in real time via a machine-learning algorithm. For more information on certain terms, please read our Glossary Of Terms in the Appendix of this report. For informational purposes only and should not be considered investment advice or a recommendation to buy, sell, or hold any particular security or cryptocurrency. Forecasts are inherently limited and cannot be relied upon. Past performance is not indicative of future results.



Bitcoin Has Appreciated Every Year Following A Halving Year

Performance Multiple of Years After a Bitcoin Halving Year



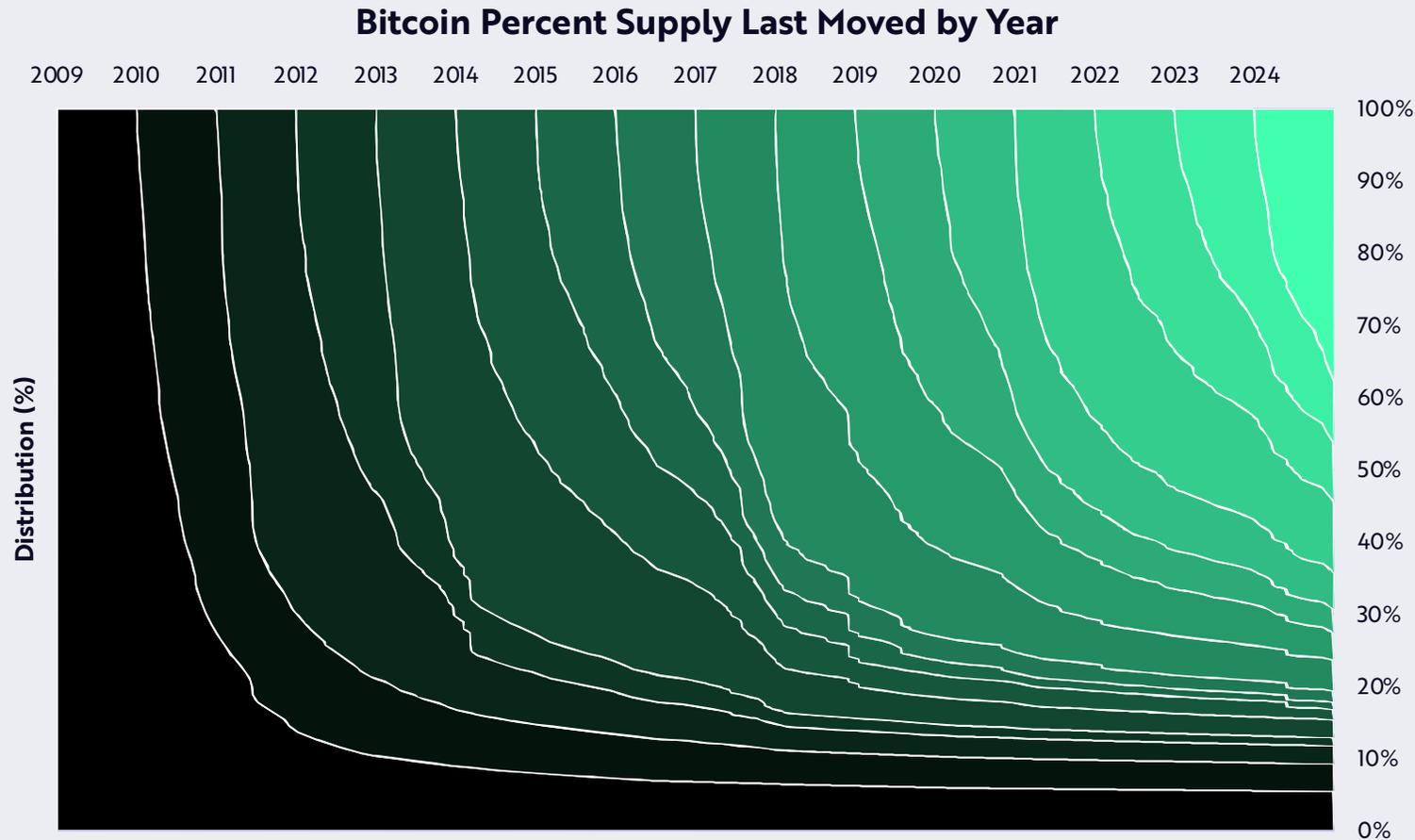
ARK'S VIEW: BULLISH

- The halving, in which bitcoin's issuance was cut in half, from 6.25 to 3.125 bitcoin per 10-minute block, occurred during April 2024.
- Historically, all years after a halving year have closed with positive returns and continued bullish momentum.
- During the post-halving years in 2013, 2017, and 2021, bitcoin's price increased 54.1x, 14.3x, and 1.6x, respectively.
- Although not a guarantee of positive returns in 2025, the four year "seasonality" suggests that bitcoin will perform well in 2025.

Source: ARK Investment Management LLC, 2025. Chart data from Glassnode. Information as of December 31, 2024. For more information on certain terms, please read our Glossary Of Terms in the Appendix of this report. For informational purposes only and should not be considered investment advice or a recommendation to buy, sell, or hold any particular security or cryptocurrency. Forecasts are inherently limited and cannot be relied upon. Past performance is not indicative of future results.



Since Early 2024, 62% Of Bitcoin Has Not Moved



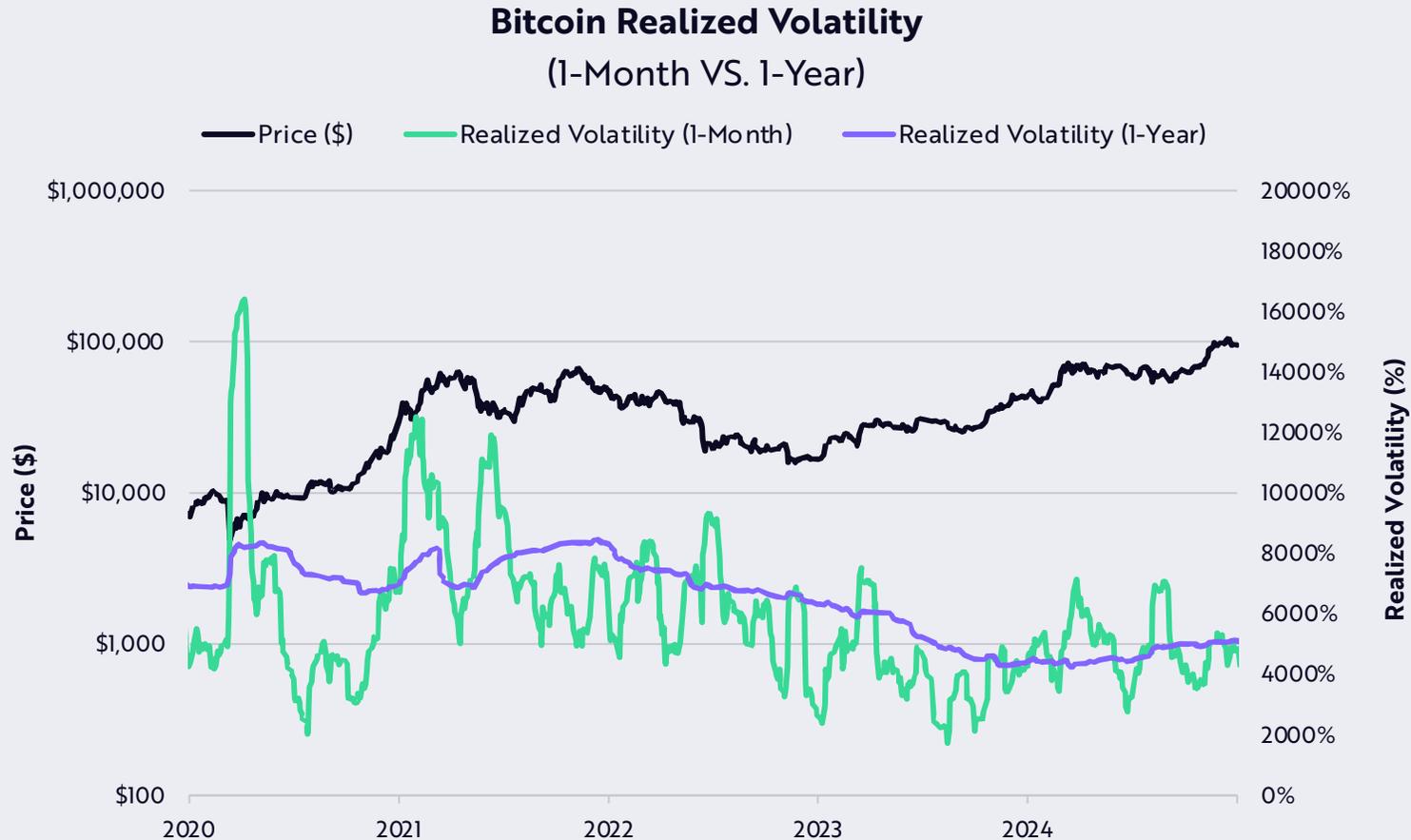
ARK'S VIEW: BULLISH

- Bitcoin's long-term holding behavior has remained strong, with the percent of dormant supply at the end of 2024 as follows:
- Dormant for:
 - 1+ year: 62%
 - 2+ years: 53%
 - 3+ years: 45%
 - 5+ years: 30%
 - 7+ years: 23%
 - 10+ years: 17%
 - 15+ years: 5%

Source: ARK Investment Management LLC, 2025. Chart data from Glassnode. Information as of December 31, 2024. For more information on certain terms, please read our Glossary Of Terms in the Appendix of this report. For informational purposes only and should not be considered investment advice or a recommendation to buy, sell, or hold any particular security or cryptocurrency. Forecasts are inherently limited and cannot be relied upon. Past performance is not indicative of future results.



Relative Volatility Suggests Future Market Expansion



ARK'S VIEW: NEUTRAL

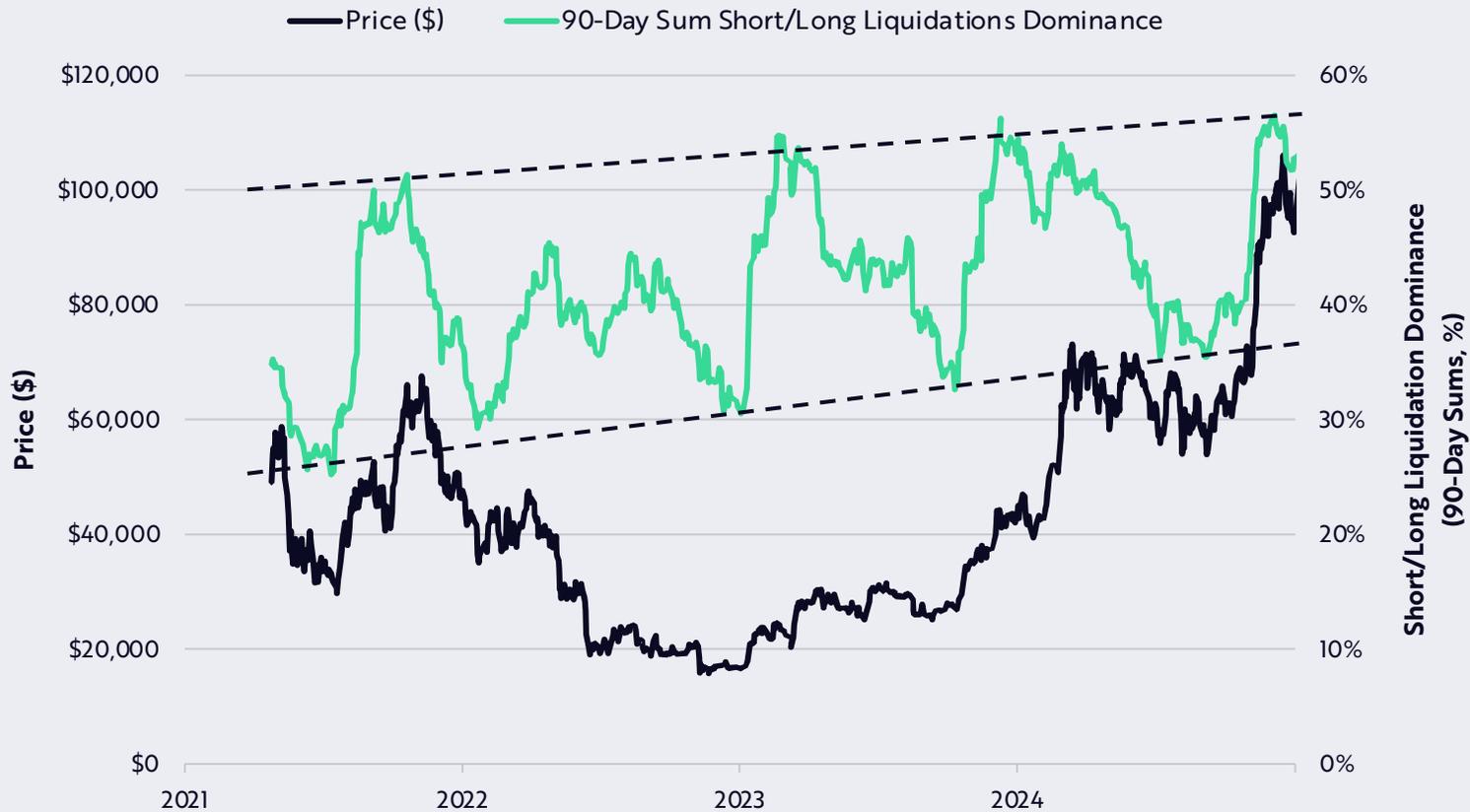
- Bitcoin's spike in volatility during the fourth quarter of 2024 was not significant in historical context.
- Bitcoin's monthly volatility (green line) relative to its yearly volatility (purple) bolsters our view.
- Indeed, these data points suggest room for further market expansion during 2025.

Source: ARK Investment Management LLC, 2025. Chart data from Glassnode. Information as of December 31, 2024. For more information on certain terms, please read our Glossary Of Terms in the Appendix of this report. For informational purposes only and should not be considered investment advice or a recommendation to buy, sell, or hold any particular security or cryptocurrency. Forecasts are inherently limited and cannot be relied upon. Past performance is not indicative of future results.



Liquidations In Off-Shore Exchange Futures Suggest Some Overheating

Bitcoin Off-Shore Exchange Short/Long Liquidation Dominance¹



ARK'S VIEW: BEARISH

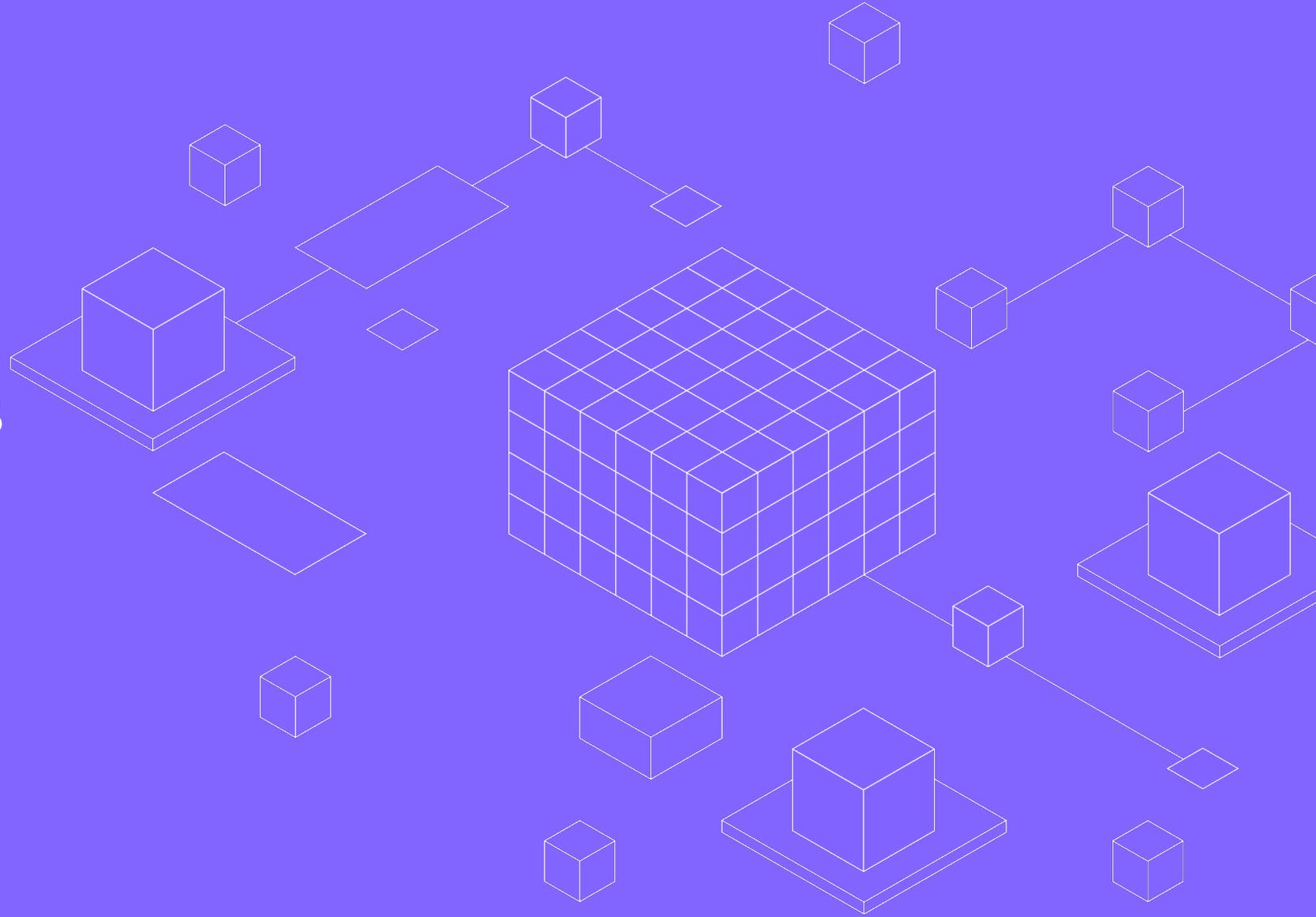
- During the fourth quarter of 2024, the bitcoin short/long dominance ratio reached record levels that suggest overheated conditions in derivatives markets.
- The short/long dominance ratio is calculated by dividing the 90-day sum of short liquidations by the 90-day sum of short *and* long liquidations in the top three crypto off-shore exchanges.

[1] Includes Binance, Bybit, and OKX. Source: ARK Investment Management LLC, 2025. Chart data from Glassnode. Information as of December 31, 2024. For more information on certain terms, please read our Glossary Of Terms in the Appendix of this report. For informational purposes only and should not be considered investment advice or a recommendation to buy, sell, or hold any particular security or cryptocurrency. Forecasts are inherently limited and cannot be relied upon. Past performance is not indicative of future results.



Section 03

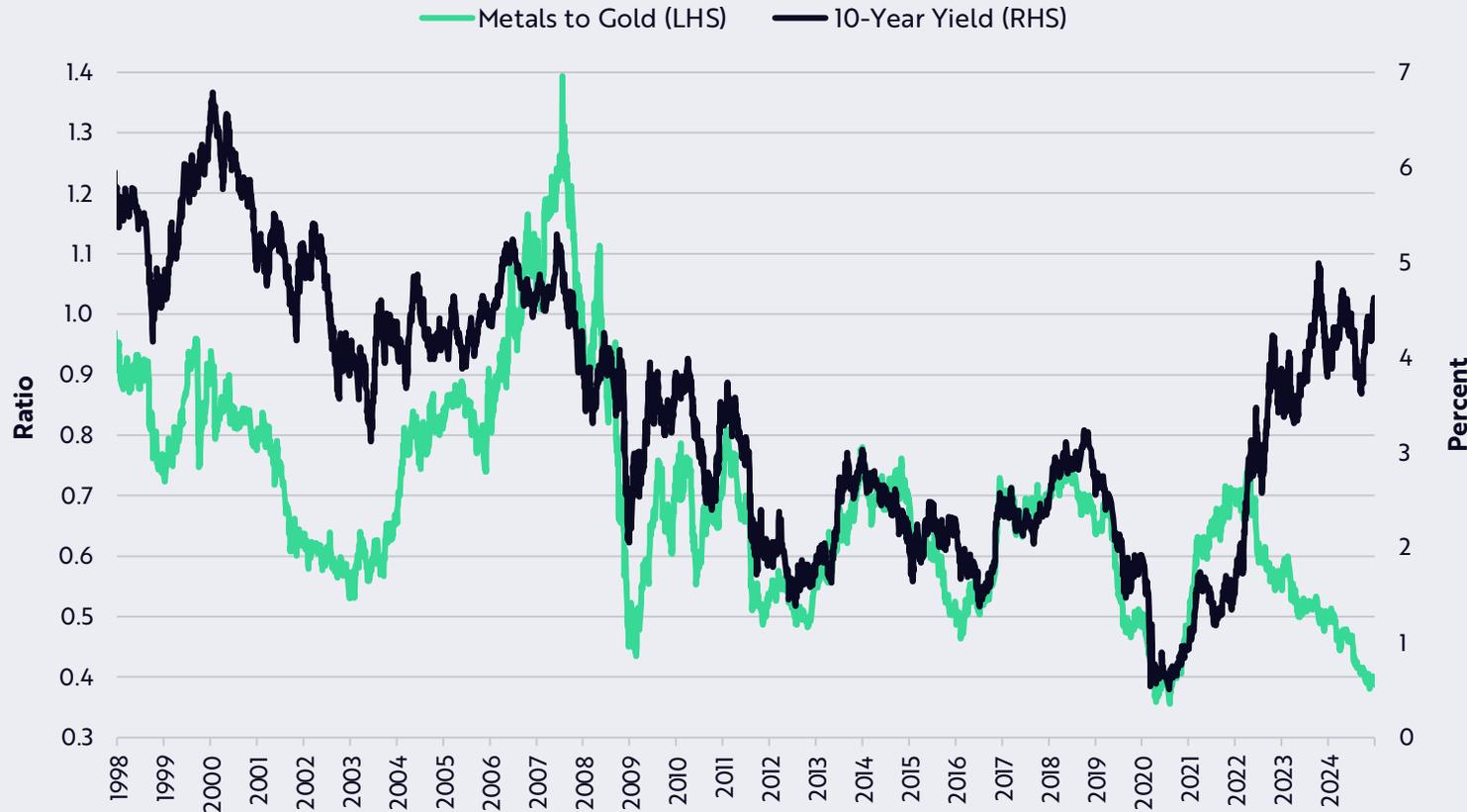
Productivity Drives Economic Growth





The Metals-To-Gold Ratio And 10-Year Treasury Yield Have Diverged

Metals/Gold Ratio VS. US 10-Year Treasury Yield



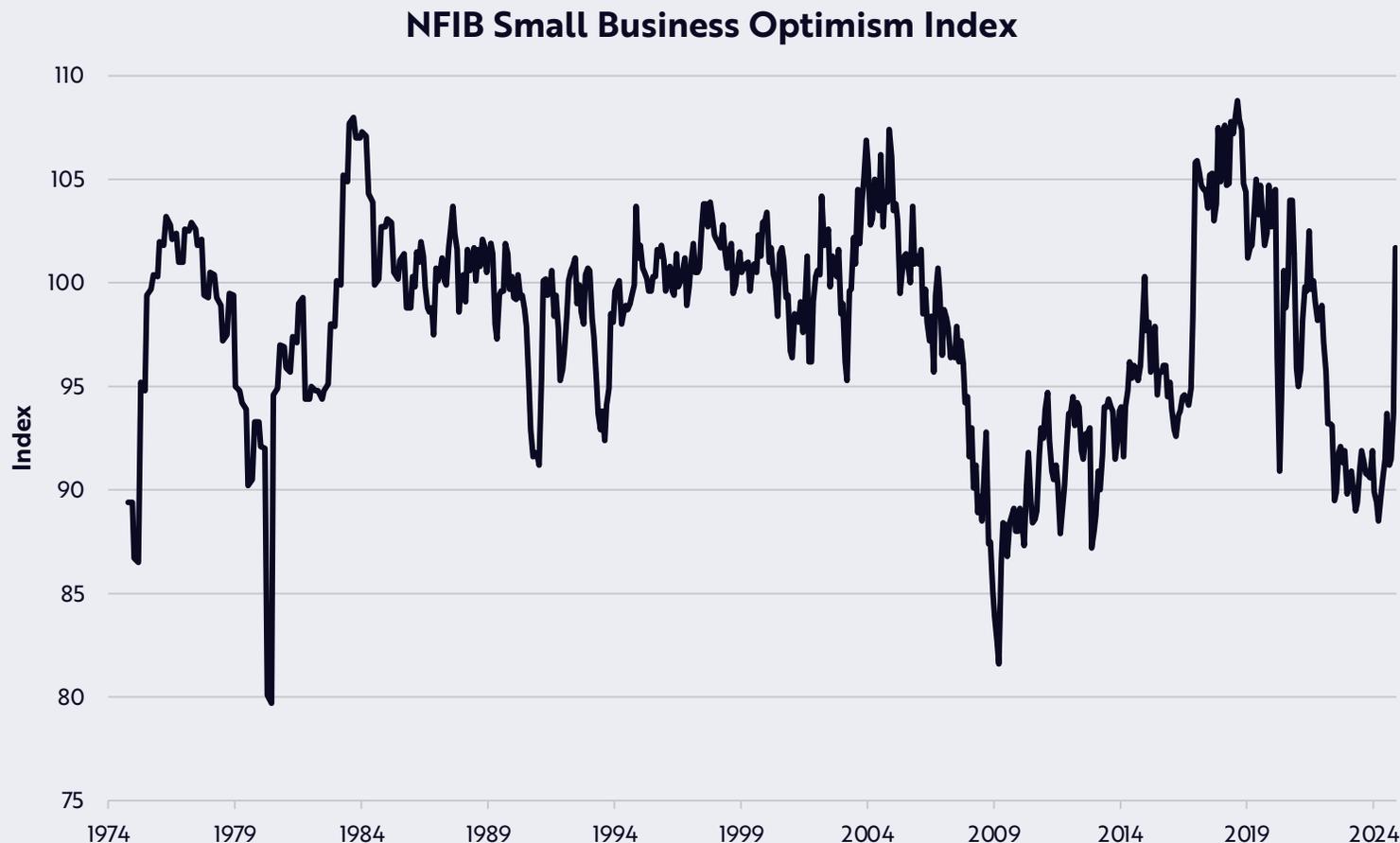
ARK'S VIEW: NEUTRAL

- The ratio of the Commodity Research Bureau (CRB) Metals price index to the Gold price index dropped below the lows registered during the Great Financial Crisis (GFC) in 2008-2009 and the COVID crisis.
- Until the Fed began raising rates in 2022, the correlation between the price ratio and long-term interest rates was high.
- If this relationship were to revert to normal, interest rates could collapse, or metals prices could rise significantly, or some combination of those scenarios.

Source: ARK Investment Management LLC, 2025. Chart data from Bloomberg. Information as of December 31, 2024. For more information on certain terms, please read our Glossary Of Terms in the Appendix of this report. For informational purposes only and should not be considered investment advice or a recommendation to buy, sell, or hold any particular security or cryptocurrency. Forecasts are inherently limited and cannot be relied upon. Past performance is not indicative of future results.



Small Business Optimism Is Bouncing Back



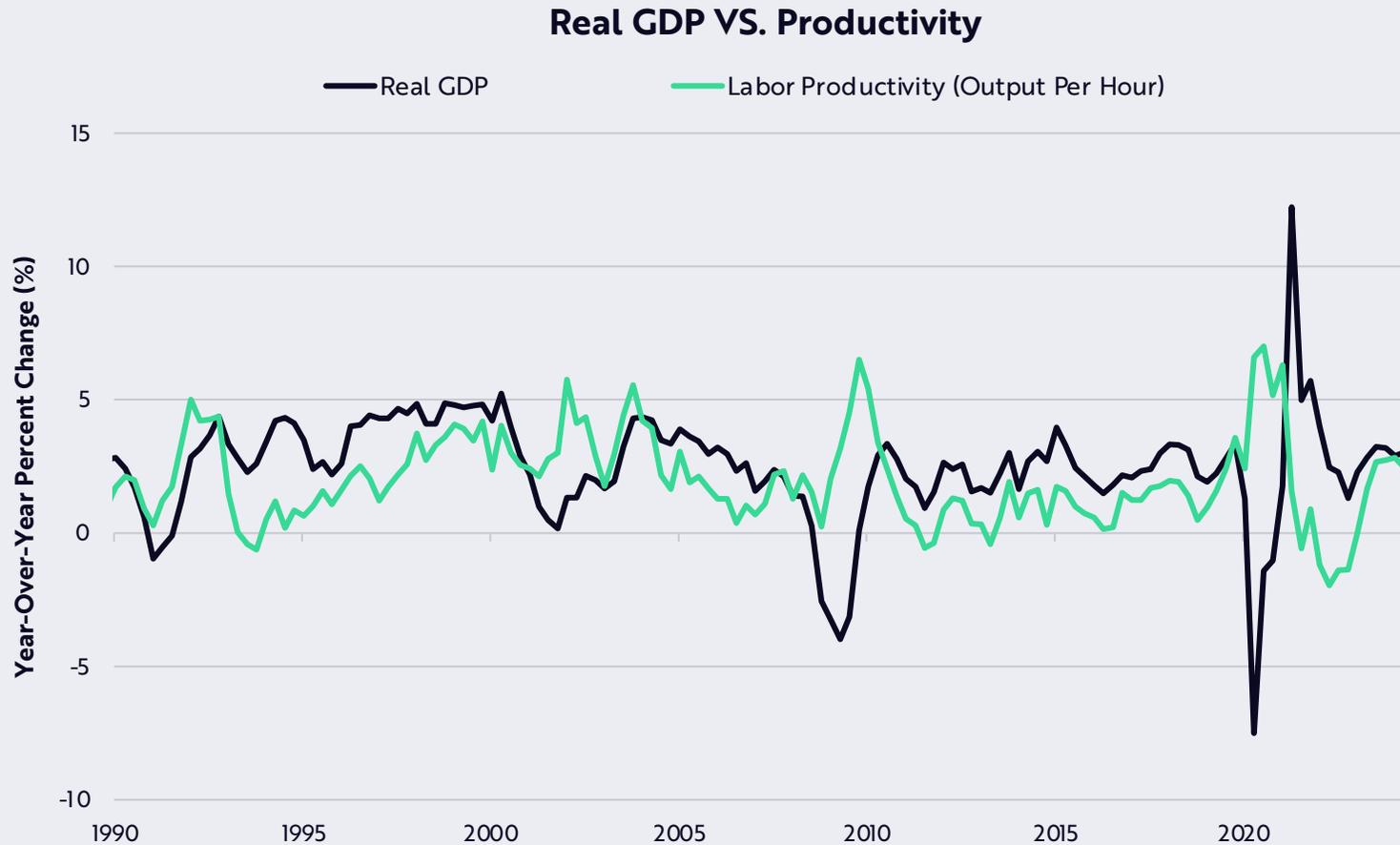
Source: ARK Investment Management LLC, 2025. Chart data from Macrobond. Information as of December 31, 2024. For more information on certain terms, please read our Glossary Of Terms in the Appendix of this report. For informational purposes only and should not be considered investment advice or a recommendation to buy, sell, or hold any particular security or cryptocurrency. Forecasts are inherently limited and cannot be relied upon. Past performance is not indicative of future results.

ARK'S VIEW: BULLISH

- As measured by the National Federation of Independent Business (NFIB), small business optimism in 2024 plummeted to levels not seen since the 2008–09 financial crisis. After the election in November, however, it rebounded.
- Corroborating the sentiment change, future new manufacturing orders surged.
- That said, noncorporate firms, which drive most job creation, are generating only ~80% of larger corporations' net income—the lowest ratio since records began in 1959.



Historically, Productivity Has Been Correlated Highly With Real GDP Growth



ARK'S VIEW: BULLISH

- Real GDP growth is tied to labor productivity, particularly in times during which new technologies are evolving and scaling.
- Productivity was strong in the second half of the 1990's during widespread adoption of computers and the internet.
- AI adoption could spur productivity and real GDP growth greater than those of the 1990s.

Source: ARK Investment Management LLC, 2025. Chart data from Macrobond. Information as of December 31, 2024. For more information on certain terms, please read our Glossary Of Terms in the Appendix of this report. For informational purposes only and should not be considered investment advice or a recommendation to buy, sell, or hold any particular security or cryptocurrency. Forecasts are inherently limited and cannot be relied upon. Past performance is not indicative of future results.



Glossary Of Terms

Accumulation Addresses: Defined as those addresses that have received two or more economically meaningful transactions (non-dust transactions) and have never spent funds. Exchange and miner addresses are discarded. "Accumulation balance" refers to coins held in these addresses.

Active Owners: An individual or organization managing the same set of addresses sending and receiving funds. Also known as active entities.

AVIV Ratio: The ratio of active capitalization (market cap adjusted for dormant coins) and investor capitalization (cost basis of the bitcoin secondary market, after a miner has sold their new coins to a counterparty).

Backwardation: Describes when futures trade at a price lower than spot, denoting bullish market sentiment.

BRC-20: A token standard that enables the minting and transaction of fungible tokens via the Ordinals protocol on the Bitcoin network.

Coinblocks Created: The number of coins in the Bitcoin network times the number of blocks at any given day.

Coinblocks Destroyed: The number of coins transacted at any given day times the number of blocks each coin remained dormant.

Contango: Describes when expirational futures contracts are trading at a price higher than spot, suggesting a bearish market environment.

Consumer Price Index (CPI): Measurement that tracks how the average price of a basket of consumer goods and services changes over time. It's often used to calculate inflation.

Delta Cost Basis: An adjusted version of the market cost basis. It is calculated by subtracting the life-to-date moving average of bitcoin's price from its realized price. The measure is used to gauge the downside risk of a bear market. Also known as delta price or delta cap.

Difficulty: Computational power required to validate transactions in the network. "Exa-" and "tera-" hashes per second refer to units of account to a factor of 10^{18} and 10^{12} , respectively. Higher difficulty implies higher network security.

Exchange Supply: The number of bitcoins held in addresses controlled by exchanges.

Expirational Futures Basis: The difference between the price of spot and the price of expirational futures contracts.

Federal Funds Policy Rate: This is the interest rate at which banks lend money to each other overnight. It's set by a country's central bank (like the Federal Reserve in the U.S.) and influences other interest rates throughout the economy.

Fiat Currency: Government-issued money that is not backed by a commodity like gold or silver, but rather by the government that issues it.

Futures Basis: The difference between the price of spot and the price of a perpetual or expirational contract.

Gross Domestic Income (GDI): This is the *nominal* total income earned by a country's residents and businesses, including wages, profits, and taxes minus subsidies. It's a way to measure the economic health of a country, much like GDP. The *real* GDI adjusts for price change by expressing values at base-year prices, not current market prices.

Gross Domestic Product (GDP): This is the *nominal* total value of all goods and services produced in a country over a certain period of time, usually a year. It's another way to measure a country's economic performance. The *real* GDP adjusts for price change by expressing values at base-year prices, not current market prices.

Hash Rate: The estimated computational power mining within and providing security to the Bitcoin network.

Investor Cost Basis: An adjusted version of the market cost basis. It is calculated by subtracting the life-to-date cumulative miner revenue in USD (thermo cap) from realized price. Also known as investor price or investor cap.

Liveliness: The ratio of the sum of coindays created to the sum of coindays destroyed. Liveliness rises when old coins move and decreases when participants hold on to their bitcoin. In essence, it's the ratio of coin movement to coin dormancy in the network.

Locked Supply: The supply held by entities that have <25% probability of spending, as per their historical behavior. Also known as illiquid supply.

Long-term Holding and Holders (LTH): Related to supply last moved 155 days ago or more, the threshold at which the possibility of a bitcoin remaining unmoved increases drastically.

M2: A measure of the US money stock that includes M1 (currency and coins held by the non-bank public, checkable deposits, and travelers' checks) plus savings deposits (including money market deposit accounts), small time deposits under \$100,000, and shares in retail money market mutual funds.

Market Cost Basis: The on-chain volume-weighted average price of the market, calculated by aggregating the value of all bitcoins in circulation at the time when they last moved. Also known as realized price or realized cap.

Miner Revenue: The number of bitcoins (in USD value) block miners obtain for securing the network.



Glossary Of Terms, Continued

MVRV Ratios: Market cap divided by different on-chain cost bases of the market, such as realized cap or short-term-holder realized cap.

MVRV Z-Score: Defined as the ratio of the difference of market cap and realized cap to the cumulative, inception-to-date standard deviation of market cap.

Natural Rate of Interest: Theoretical interest rate that at which the economy is neither expanding nor contracting.

Net Realized Profit/Loss (NRPL): The difference between realized profit and realized loss, normalized by market cap.

Net Unrealized Profit/Loss (NUPL): The difference between unrealized profit and unrealized loss, normalized by market cap. It measures current value relative to the aggregate cost basis (realized cap) of the market to determine how much the network is in profit or loss.

On-Chain: Refers to metrics or economic activity occurring on the blockchain ledger of most cryptocurrencies.

On-Chain Mean: Developed collaboratively by ARK Invest and Glassnode, on-chain mean is calculated by dividing the cost basis capitalization of investors—the secondary market of the Bitcoin network—by the number of active coins in the network based on their aggregate time of dormancy proportional to total supply. Also known as “active-investor price” or “true market mean.”

Ordinals: Refers to the creation of non-fungible tokens (NFTs) in the Bitcoin network by making Inscriptions, where metadata such as images or videos are attached to individual satoshis (the smallest unit of account).

Patoshi: Entity estimated to be Satoshi Nakamoto, the creator and first miner of bitcoin.

Perpetual Futures Basis: The difference between the price of spot and the price of non-expirational futures contracts.

Puell Multiple: Miner revenue (USD) divided by the 365-day moving average of miner revenue (USD). It measures miner earnings relative to their yearly average.

Realized Returns (SOPR): The ratio reached by dividing the average price of bitcoins spent that day by the average price when they last moved. In essence, it is the ratio of price sold to price bought for the coins that moved that day. Also known as spent output ratio, or SOPR.

Regional Cumulative Price Change: The sum of month-over-month (30-day) price action during the business hours of the major financial hubs worldwide: New York for the US, London for Europe, and Hong Kong for Asia.

Seller Exhaustion Constant: A metric created by ARK to measure the convergence of two market factors: high losses denoting capitulation and low volatility denoting market exhaustion.

Short-term Holding and Holders (STH): Related to supply that moved in the last 155 days, the threshold at which the potential for a bitcoin to move again increases drastically.

SOPR: The Spent Output Profit Ratio is calculated by dividing the realized value of a spent output (in USD) divided by the dollar value at the point of its creation. In other words, it divides the aggregate price of coins sold by the aggregate price where those coins were initially bought.

Supply in Profit (Percentage): The percentage of bitcoins currently at a higher price compared to the price at which they last moved.

S&P 500 Index: Short for “The Standard and Poor’s 500,” it is a stock market index tracking the performance of 500 of the largest public companies in the United States.

Time-weighted Turnover: The number of bitcoins traded that day, multiplied by the amount of time each coin had remained dormant. Also known as coindays destroyed.

Transaction Volume: The number of bitcoins that changed hands on any given day.

Velocity-Adjusted Cost Basis: It subtracts the cumulative dollar value of coins spent over time from the general cost basis of the market (realized price). Also known as balanced price is (the smallest unit of account).



For more research on disruptive innovation visit www.ark-invest.com

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ARK aims to educate investors and to size the potential opportunity of Disruptive Innovation, noting that risks and uncertainties may impact our projections and research models. Investors should use the content presented for informational purposes only, and be aware of market risk, disruptive innovation risk, regulatory risk, and risks related to Deep Learning, Digital Wallets, Battery Technology, Autonomous Technologies, Drones, DNA Sequencing, CRISPR, Robotics, 3D Printing, Bitcoin, Blockchain Technology, etc. **Cryptocurrency Risk.** Cryptocurrencies (also referred to as "virtual currencies" and "digital currencies") are digital assets designed to act as a medium of exchange. Cryptocurrency is an emerging asset class. There are thousands of cryptocurrencies, the most well-known of which is bitcoin. Cryptocurrency generally operates without central authority (such as a bank) and is not backed by any government. Cryptocurrency is not legal tender. Federal, state and/or foreign governments may restrict the use and exchange of cryptocurrency, and regulation in the U.S. is still developing. The market price of bitcoin and other cryptocurrencies have been subject to extreme fluctuations. Similar to fiat currencies (i.e., a currency that is backed by a central bank or a national, supra-national or quasi-national organization), cryptocurrencies are susceptible to theft, loss and destruction. Cryptocurrency exchanges and other trading venues on which cryptocurrencies trade are relatively new and, in most cases, largely unregulated and may therefore be more exposed to fraud and failure than established, regulated exchanges for securities, derivatives and other currencies. Cryptocurrency exchanges may stop operating or permanently shut down due to fraud, technical glitches, hackers or malware, which may also affect the price of cryptocurrencies. **Cryptocurrency Tax Risk.** Many significant aspects of the U.S. federal income tax treatment of investments in bitcoin and other cryptocurrencies are uncertain and still evolving.

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