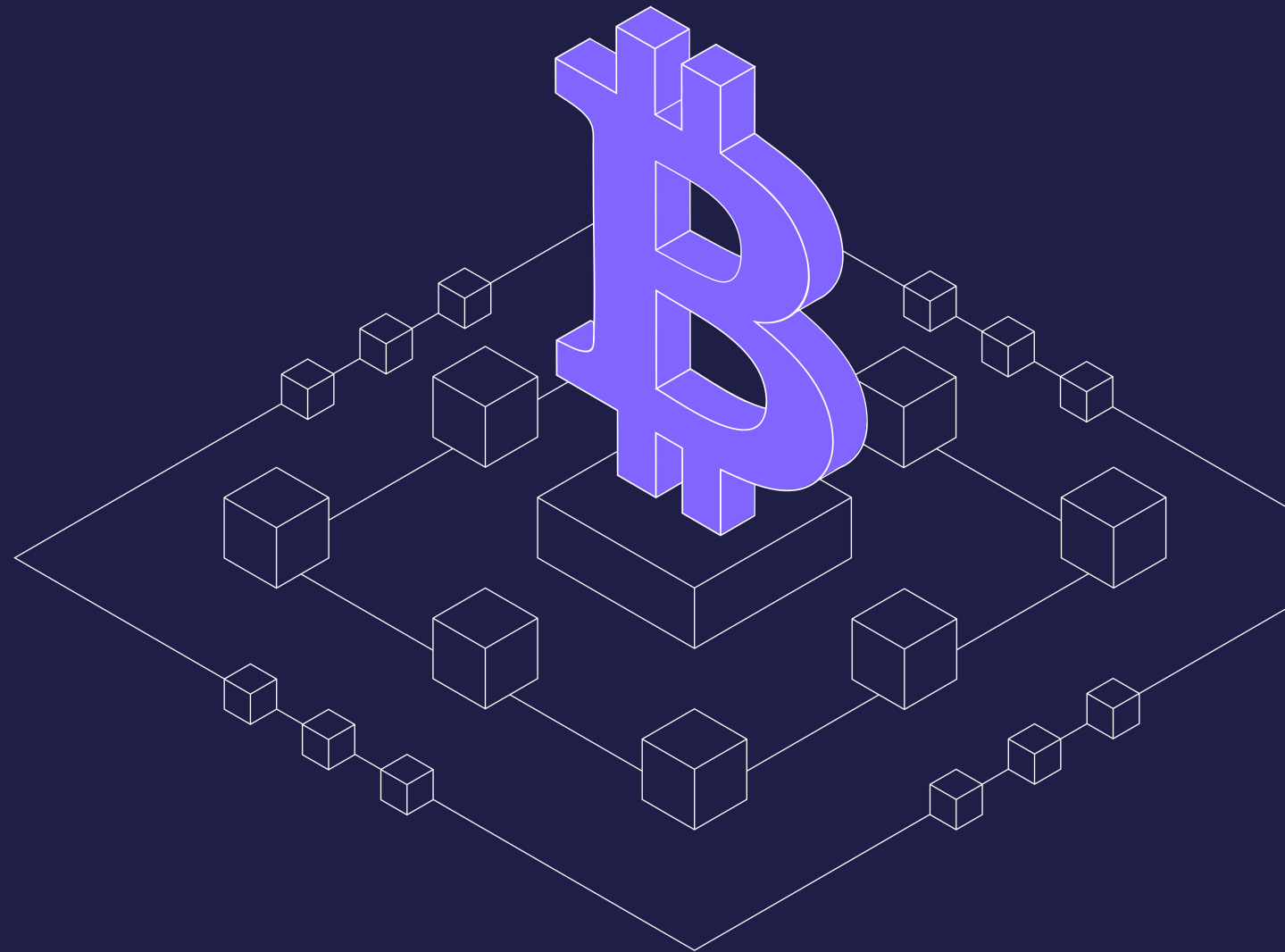


October 2024

# THE BITCOIN MONTHLY

HEALTHY MARKET STRUCTURE AMID  
ELECTION UNCERTAINTY



**For Informational Purposes Only.** ARK Investment Management LLC, 2024 This is not investment advice or a recommendation in relation to any named particular securities or cryptocurrencies and no warranty or guarantee is provided. Any references to particular securities or cryptocurrencies are for illustrative purposes only. The reader should not assume that an investment identified was or will be profitable. Certain information was obtained from sources that ARK believes to be reliable; however, ARK does not guarantee the accuracy or completeness of any information obtained from any third party. Forecasts are inherently limited and cannot be relied upon. **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

---

01

### **Market Summary**

---

02

### **Healthy Market Structure Amid Election Uncertainty**

---

03

### **Deficits, Taxes, Money Supply**

---

04

### **Appendix: Glossary Of Terms**

---



Section 01

---

# Market Summary





# Bitcoin's Market Structure Remained Healthy Amid Election Uncertainty

## Healthy Market Structure

- During October, bitcoin's price increased 10.9% to \$70,250, closing above its 200-day moving average, its short-term-holder (STH) cost basis, and its on-chain mean at \$63,359, \$64,266, and \$48,832, respectively.
- In the US, the AUM (assets under management) in spot bitcoin ETFs hit a record high, ending October at \$70 billion.
- Compared to the contango—that is, the future price relative to the near-by price—that peaked at ~30% late last March, the futures basis in offshore exchanges closed October at 11.1%.
- This cycle, the AVIV ratio has not hit levels historically associated with overbought conditions. Extrapolation suggests that a breakout in bitcoin's price to an all-time could lead to a target price of ~\$115,000.

## Deficits, Taxes, Money Supply

- The rising budget deficit highlights ongoing fiscal challenges and government spending priorities.
- In this cycle, M2 growth has led inflation, as measured by the CPI, by ~18 months, suggesting that consumer price inflation should continue to decline during the next six months.

## ARK'S KEY TAKEAWAYS

- During October, bitcoin's price increased 10.9% to \$70,250, surpassing its main means and cost bases.
- Unlike its price, the US spot bitcoin ETF balances hit a record high.
- Consumer price inflation is likely to decelerate further.



# News Of The Month

---

[Robinhood Launches Crypto Transfers In Europe As It Pushes Overseas Expansion](#)

---

[Coinbase To Delist Unauthorized Stablecoins In EU By December](#)

---

[US Bankruptcy Judge Approves FTX Reorganization Plan, Two Years After The Exchange's Collapse](#)

---

[Bitfinex Deemed "Sole Victim" Eligible For Recovery Of \\$7.4 Billion Bitcoin Hack](#)

---

[Italy Plans To Raise Capital Gains Tax On Bitcoin From 26% To 42%](#)

---

[SEC Gives NYSE And Cboe The Go-Ahead To List Options Trading For Multiple Spot Bitcoin ETFs](#)

---

[Stripe Acquires Stablecoin Platform Bridge For \\$1.1 Billion In Crypto's Largest Acquisition](#)

---

[US Treasury Says Stablecoin Growth Is Increasing Demand For T-Bills](#)

---

[Michael Saylor's MicroStrategy Plans To Raise \\$42 Billion To Buy More Bitcoin Over Next 3 Years](#)

---



# Bitcoin's On-Chain Data Strengthened, On Balance

|                  | Bitcoin Metrics <sup>1</sup>   | Unit                                    | October 2024 | 1M Change | 1Y Change | ARK's View | Upgrade/Downgrade <sup>3</sup> |
|------------------|--|---|--------------|-----------|-----------|------------|--------------------------------|
| Network Security | <u>Mining Difficulty</u>   | Exahash/sec <sup>1</sup><br>(Thousands) | 410.9        | +8.22%    | +53.16%   | Bullish    | ↑                              |
|                  | <u>Miner Revenue</u><br>(7-Day Moving Average)                                   | USD<br>(Millions)                       | 35.9         | +25.13%   | +8.31%    | Bullish    | No Change                      |
| Network Usage    | <u>Active Owners</u> <sup>2</sup><br>(Active Entities, 7-Day Moving Average)     | Thousands                               | 211.4        | +6.31%    | -25.68%   | Neutral    | No Change                      |
|                  | <u>Transaction Volume</u> <sup>2</sup><br>(7-Day Moving Average)                 | BTC<br>(Thousands)                      | 134          | +19.28%   | +6.96%    | Bullish    | No Change                      |
| Holder Behavior  | <u>Long-Term-Holder Supply</u> <sup>2</sup><br>(Coins Held for 155 Days+)        | BTC<br>(Millions)                       | 14           | -0.88%    | -1.41%    | Bearish    | ↓                              |
|                  | <u>Locked Supply</u> <sup>2</sup><br>(Illiquid Supply)                           | BTC<br>(Millions)                       | 14.7         | +0.58%    | +2.31%    | Bullish    | No Change                      |
|                  | <u>Time-Weighted Turnover</u> <sup>2</sup><br>(Coindays Destroyed, 7-Day Median) | Coindays<br>(Millions)                  | 11.9         | +5.21%    | -1.83%    | 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 October 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.



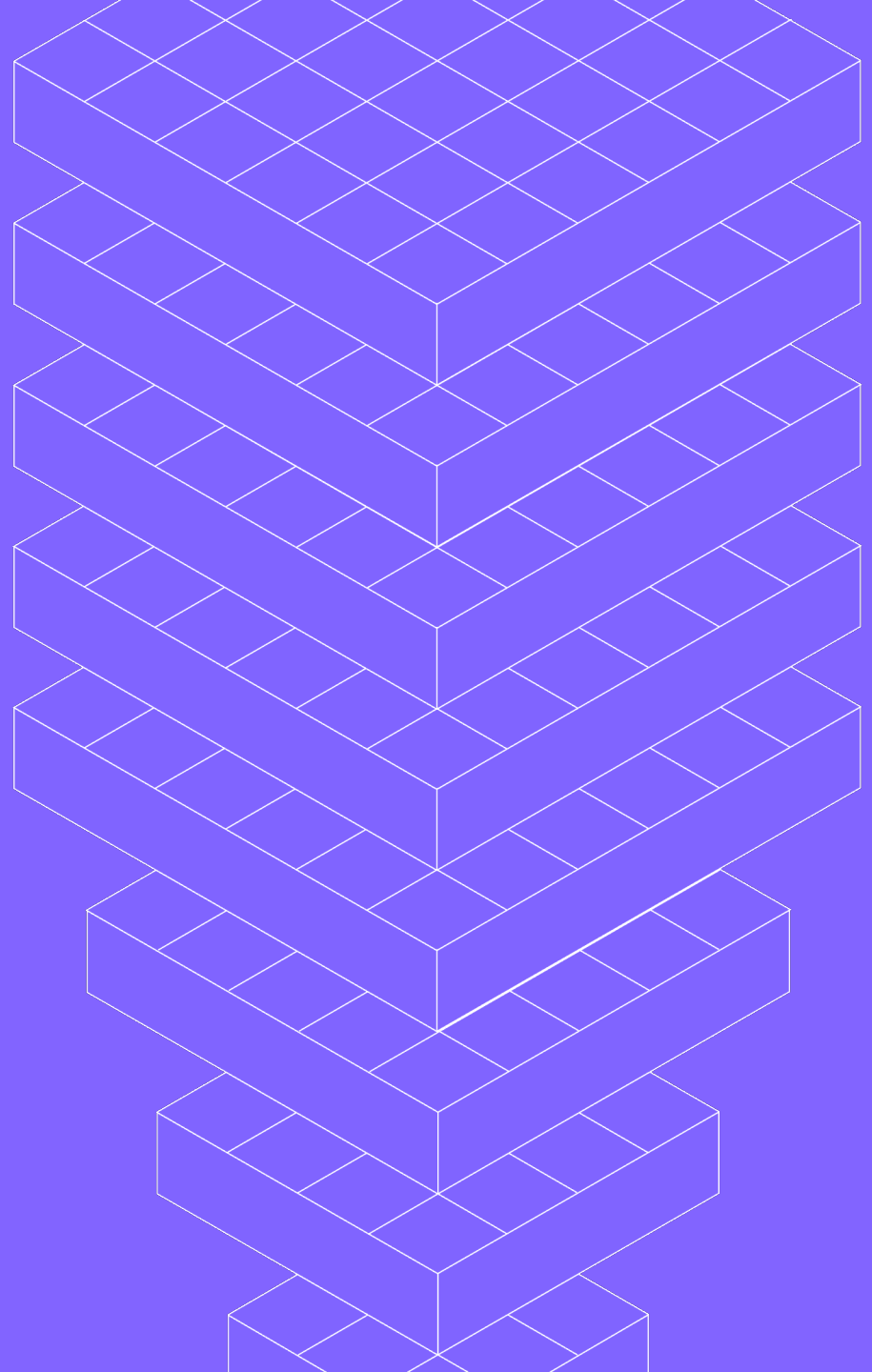
# Cost Bases And The Derivatives Market Remain In Net Positive Territory

|                      | Bitcoin Metrics <sup>1</sup>   | Unit | October 2024 | 1M Change | 1Y Change | ARK's View | Upgrade/Downgrade <sup>3</sup> |
|----------------------|--|------|--------------|-----------|-----------|------------|--------------------------------|
| Long-Term Valuation  | <u>Market Cost Basis</u><br>(Realized Price)                                 | USD  | \$33,070     | +3.56%    | +60.23%   | Bullish    | No Change                      |
|                      | <u>Percent Supply In Profit</u>  | pp   | 95.7         | +12.83    | +12.7     | Neutral    | No Change                      |
| Short-Term Valuation | <u>Short-Term-Holder Cost Basis<sup>2</sup></u><br>(STH Realized Price)      | USD  | \$64,266     | +2.44     | +188.88%  | Bullish    | ↑                              |
|                      | <u>Realized Market Returns<sup>2</sup></u><br>(SOPR-1, 7-day moving average) | pp   | 8.9          | +1.39     | -2.61     | Neutral    | No Change                      |
| Market Sentiment     | <u>Perpetual Futures Basis</u><br>(Binance, Estimated)                       | pp   | 0.04         | +0.07     | 0.0       | Neutral    | ↓                              |
|                      | <u>Expirational Futures Basis</u><br>(Quarterly, All Exchanges, Annualized)  | pp   | 11.1         | +4.47     | +2.11     | Neutral    | No Change                      |

[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 October 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.



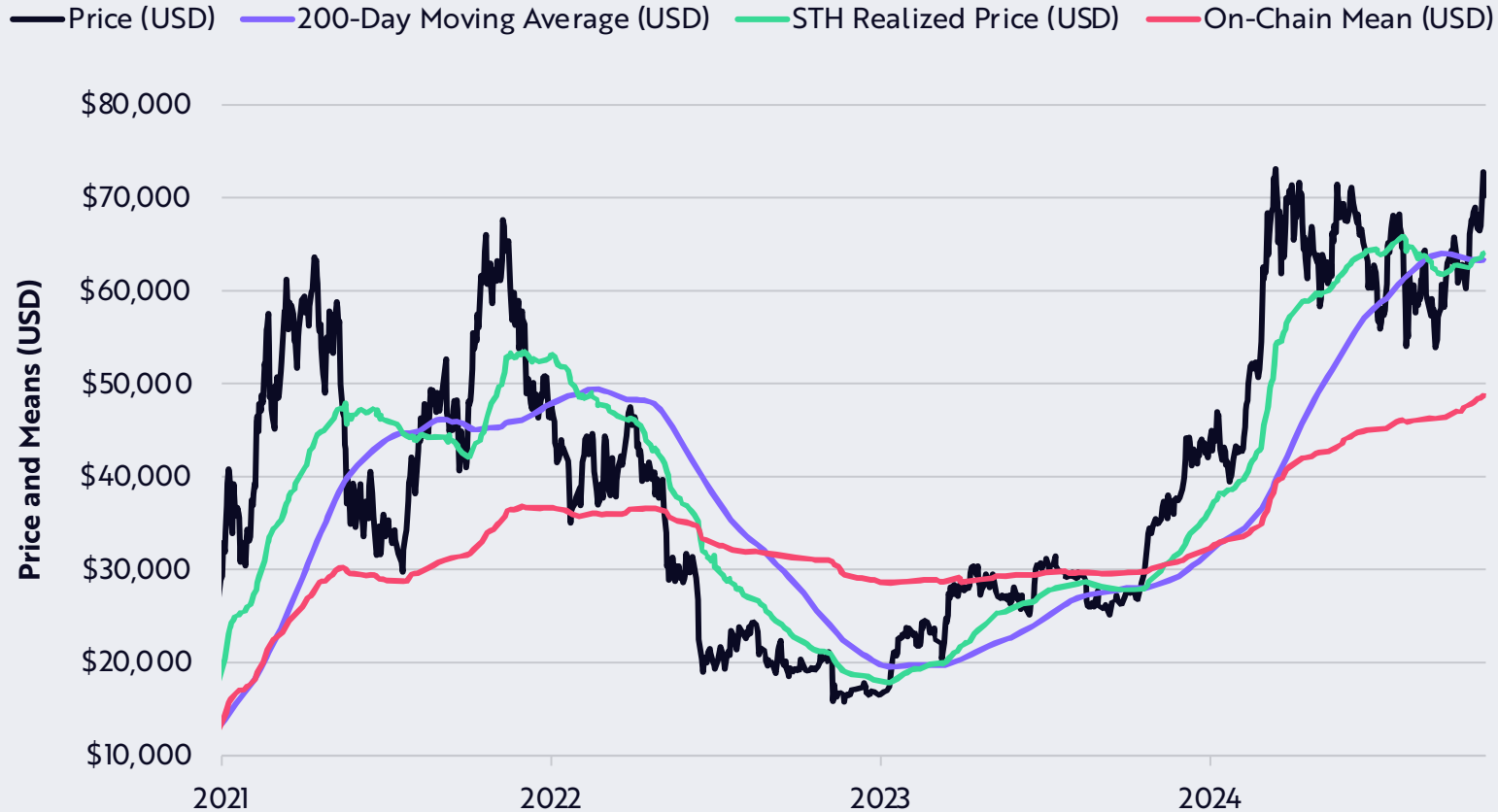
# Healthy Market Structure Amid Election Uncertainty





# Bitcoin's Price Hit Its Highest Level Since March 2024

## Bitcoin Mean Reversion



### ARK'S VIEW: NEUTRAL

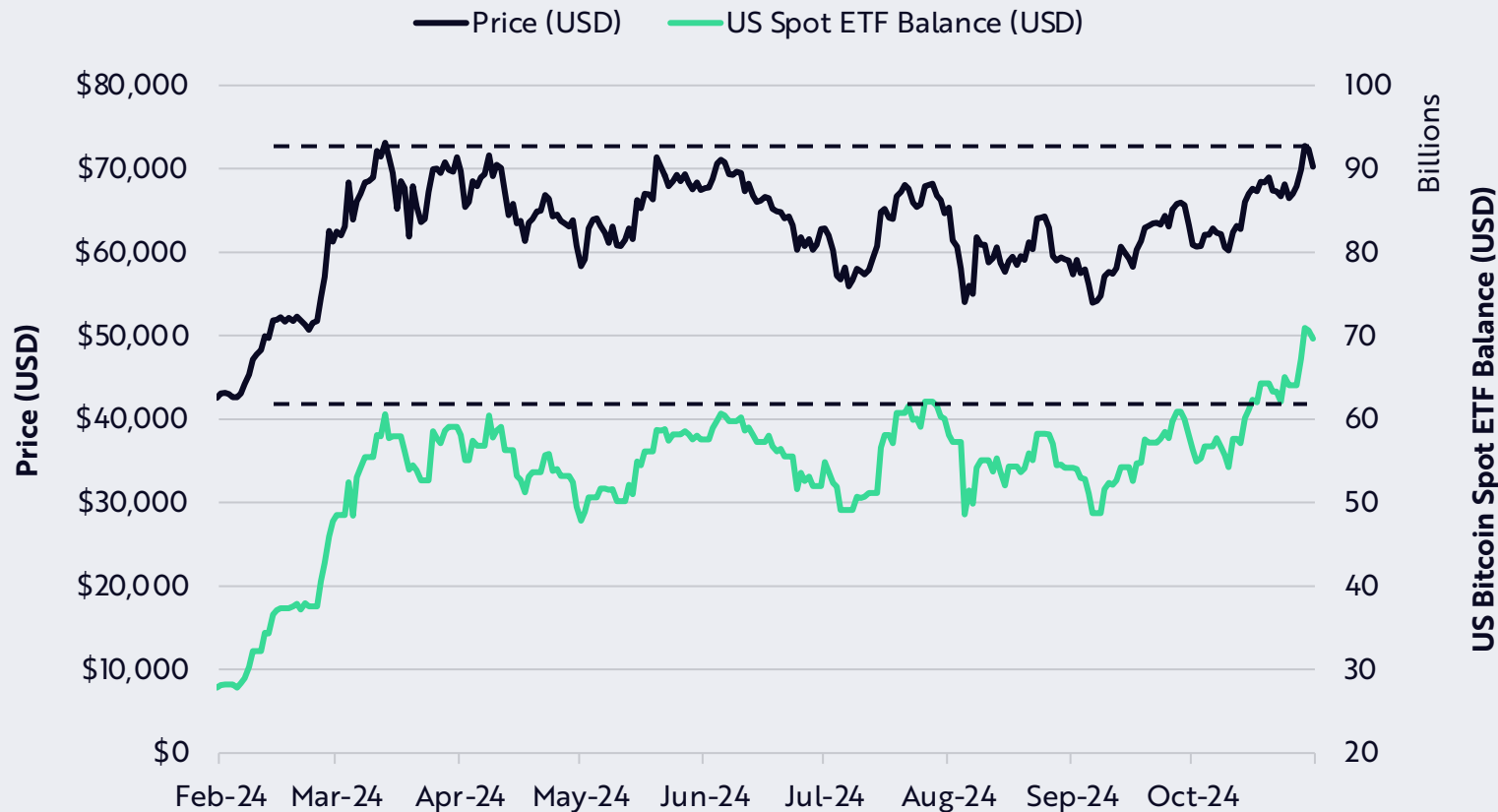
- During October, bitcoin's price increased 10.9% to \$70,250.
- Bitcoin closed above its 200-day moving average, its short-term-holder (STH) cost basis, and its on-chain mean at \$63,359, \$64,266, and \$48,832, respectively.

Source: ARK Investment Management LLC, 2024. Chart data from Glassnode. Information as of October 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.



# The AUM In US Bitcoin Spot ETFs Hit A Record High

## Bitcoin Price vs. US Bitcoin Spot ETF Balance<sup>1</sup>



### ARK'S VIEW: BULLISH

- In October, bitcoin's price reached but did not surpass its record high in March: ~\$73,000.
- By the end of October, the AUM (assets under management) in US spot bitcoin ETFs balance hit a record high at ~\$70 billion.
- Under normal sell-side conditions, spot bitcoin ETF balances could be a leading indicator of the bitcoin price through early 2025.

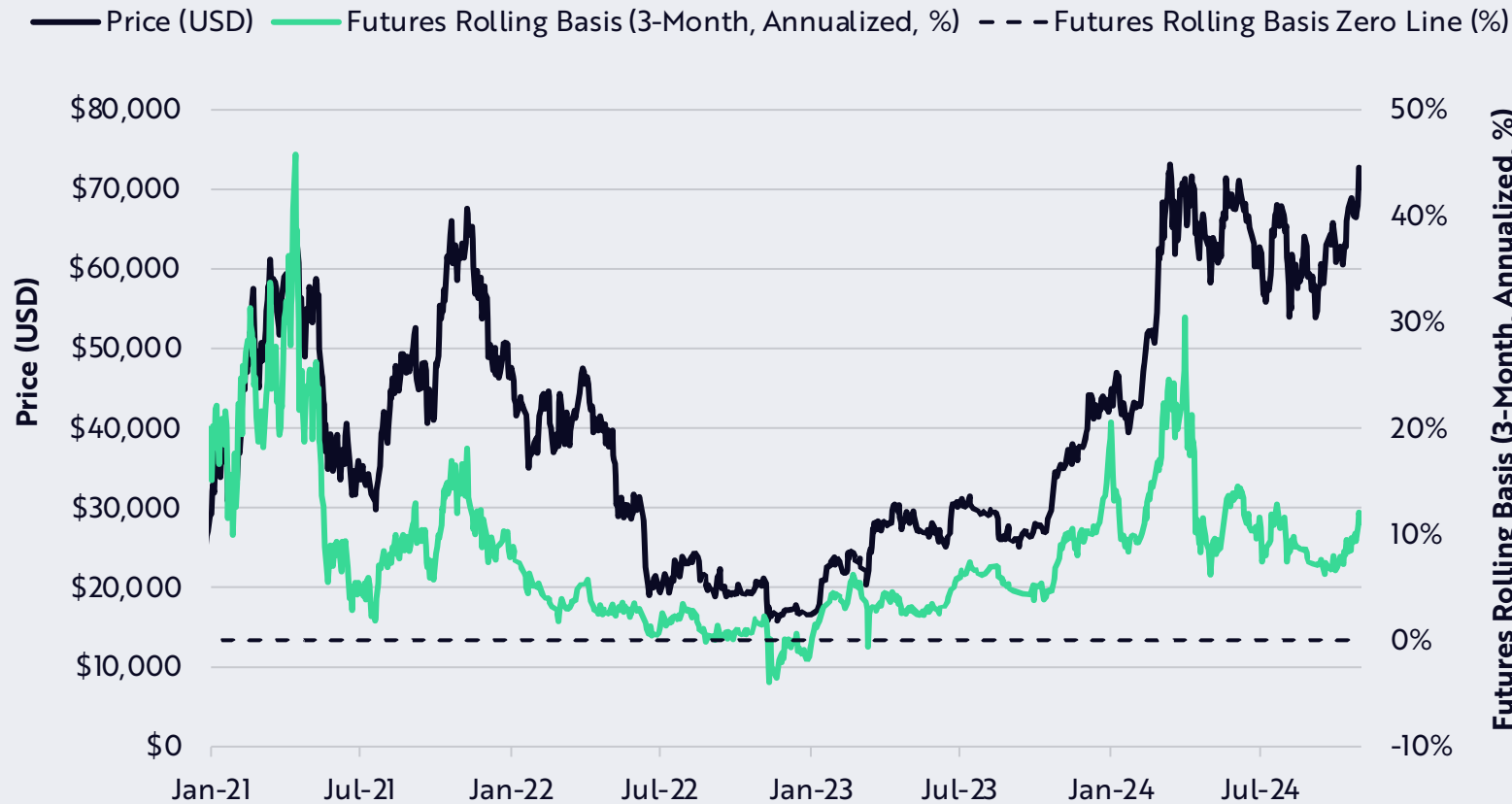
[1] Includes IBIT, GBTC, Grayscale Mini Trust, FBTC, ARKB, BITB, HODL, BRRR, BTCO, EZBC, and BTCW. Source: ARK Investment Management LLC, 2024. Chart data from Glassnode. Information as of October 31, 2024. For more information on certain terms, please read our Glossary Of Terms in the Appendix of this 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.



# The Last Time Bitcoin Hit \$71,000, Its Contango Was 18 Percentage Points Higher

## Bitcoin Futures Rolling Basis<sup>1</sup>

(3-Month, Annualized)



### ARK'S VIEW: BULLISH

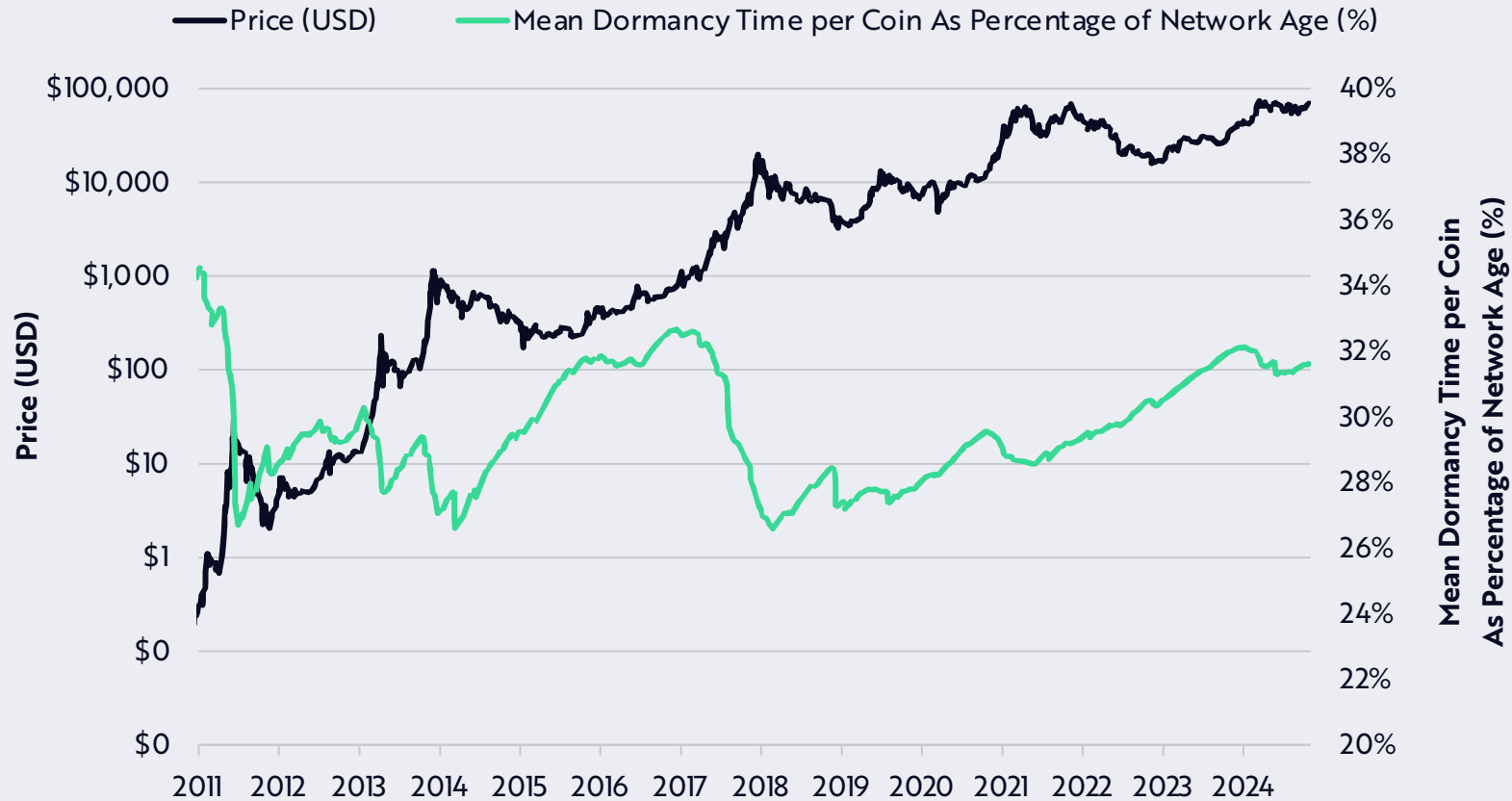
- Contango captures a positive future basis, meaning the futures price is trading above the spot price. Historically, an expirational contract in which the bitcoin futures price is trading higher than its spot price has been associated with pending or actual bear markets.
- Compared to the 30% contango peak late last March, the futures basis in offshore exchanges—usually considered the most speculative sector in the bitcoin market—closed at a relatively tame 11.1%.
- At peak contango earlier in 2024, price was ~\$71,000, not far from October's price.
- This dynamic suggests that the market is less overbought now than earlier this year.

[1] Includes only Binance, Bybit, Deribit, and OKX. Source: ARK Investment Management LLC, 2024. Chart data from Glassnode. Information as of October 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.



# The Mean Dormancy Per Bitcoin Is One-Third The Age Of The Bitcoin Network

## Bitcoin Mean Dormancy per Coin as Percentage of Network Age



### ARK'S VIEW: BULLISH

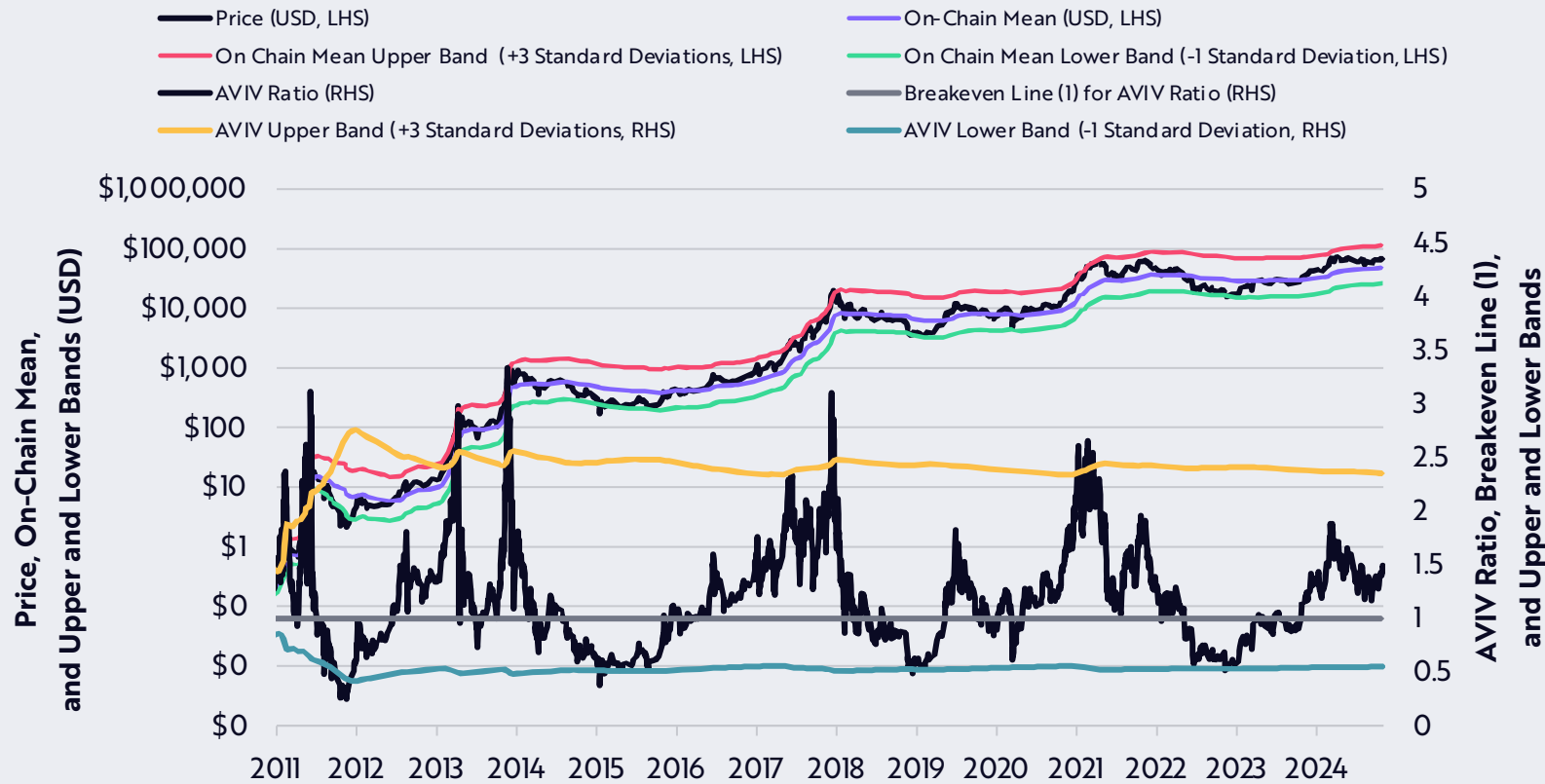
- Mean dormancy refers to the period during which the average bitcoin has not been moved.
- In October, the mean dormancy period per coin in the Bitcoin network crossed the 5-year mark for the first time.
- Currently, the mean dormancy per coin is roughly one third (~32%) of Bitcoin's total lifespan.
- At 32%, the mean dormancy per coin typically has been correlated with upward momentum in bitcoin's price.
- We calculate mean dormancy per coin by dividing (1) the difference between total coinblocks created and coinblocks destroyed, by (2) the total bitcoin supply.<sup>1</sup>

[1] For more information on certain terms, please read our Glossary Of Terms in the Appendix of this report. Source: ARK Investment Management LLC, 2024. Chart data from Glassnode. Information as of October 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. Forecasts are inherently limited and cannot be relied upon. Past performance is not indicative of future results.



# A Breakout Could Spur Bitcoin's AVIV To Target A Price Of ~\$115,000

## Bitcoin On-Chain Mean, AVIV Ratio, and Upper and Lower Standard Deviation Bands



### ARK'S VIEW: NEUTRAL

- At all prior cycle highs in the bitcoin price, the yellow line at 3 standard deviations has been above the cumulative mean of the Active-Value-to-Investor-Value (AVIV) ratio.<sup>1</sup>
- When AVIV reaches that line, irrational exuberance typically leads to a top in the bitcoin price.
- In the current cycle, the AVIV ratio has not hit the 3-sigma level. As of the end of October, an extrapolation—illustrated by the red line—suggests a target price of ~\$115,000.

[1] The AVIV divides active capitalization—the amount of market cap that has economically moved—by the investor's cost basis. Source: ARK Investment Management LLC, 2024. Chart data from Glassnode. Information as of October 31, 2024. [1] 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

---

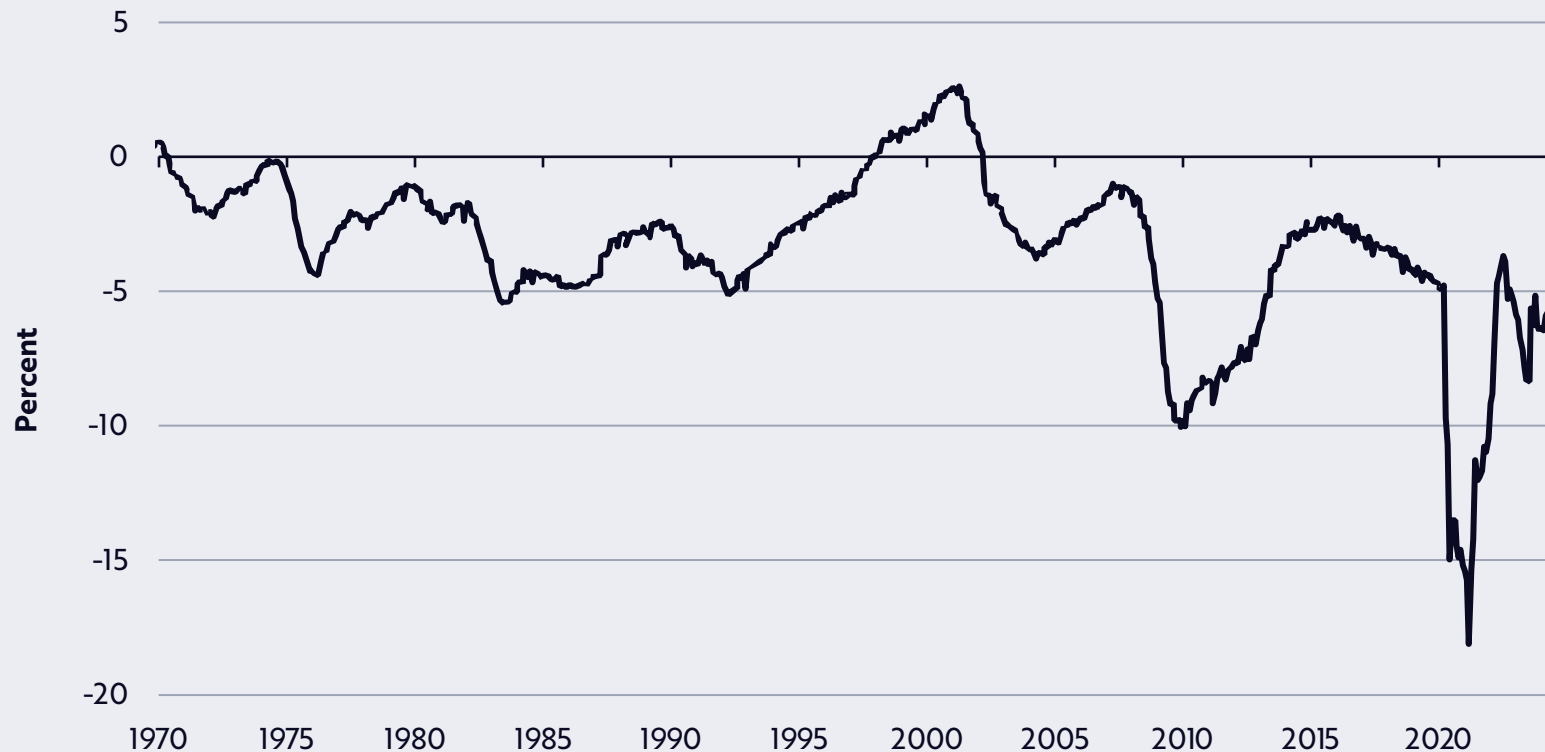
# Deficits, Taxes, Money Supply





# The US Federal Budget Deficit Is On An Unustainable Path

## US Treasury Federal Budget Deficit Or Surplus as a Percentage of Nominal GDP



### ARK'S VIEW: NEUTRAL

- During the past 25 years, larger budget deficits have highlighted ongoing fiscal challenges and controversies.
- Deficit spending could push capital toward cryptocurrencies as investors hedge against the debasement of fiat currencies.

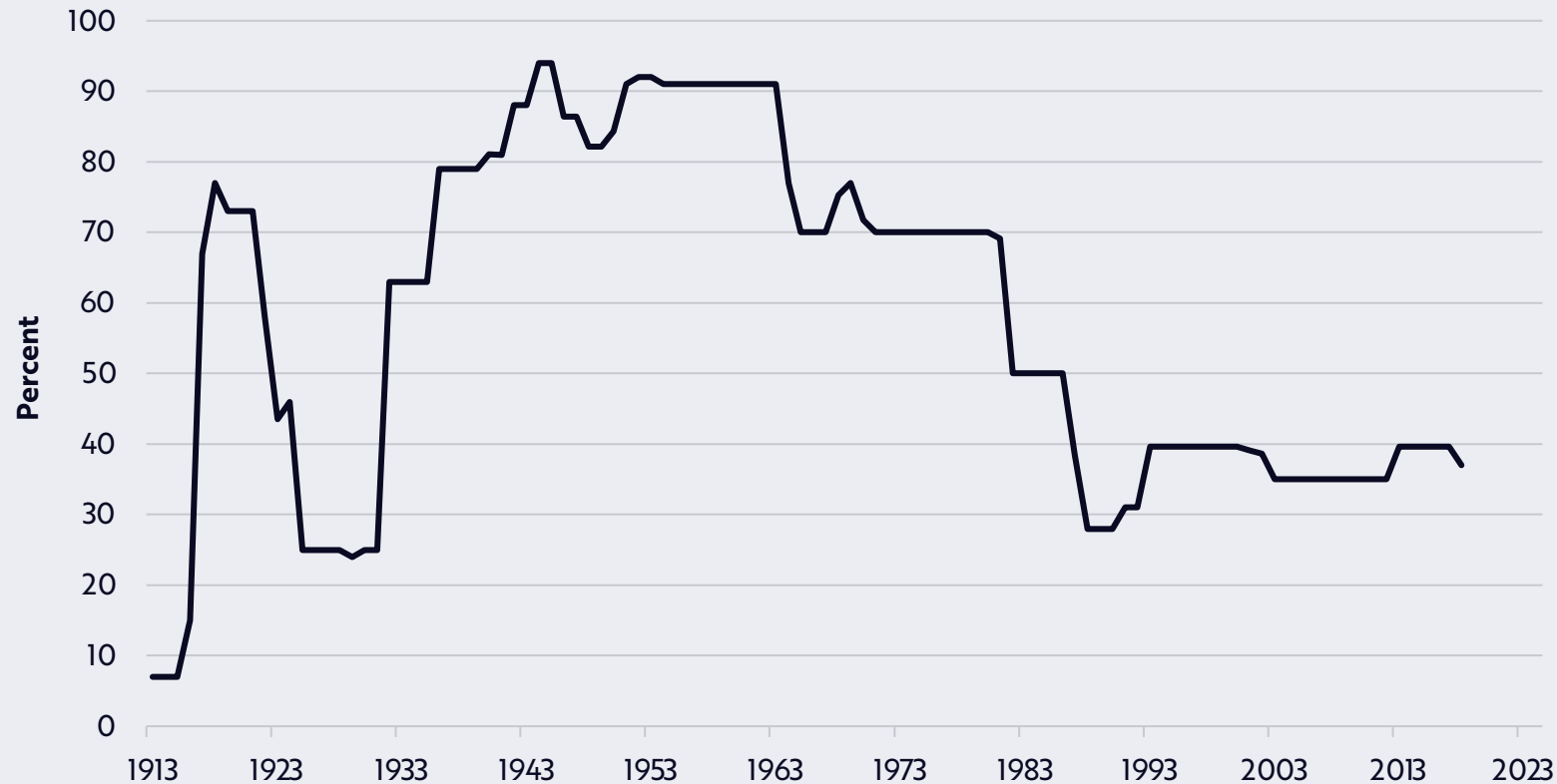
ARK Investment Management LLC, 2024. Chart data from FRED. Information as of October 31, 2024. For informational purposes only and should not be considered investment advice or a recommendation to buy, sell, or hold any particular security or cryptocurrency. Forecasts are inherently limited and cannot be relied upon. Past performance is not indicative of future results.





# Income Tax Should Be Lower During Peacetime

**US Individual Income Tax<sup>1</sup>**  
(Tax Rates for Regular Tax, Highest Bracket)



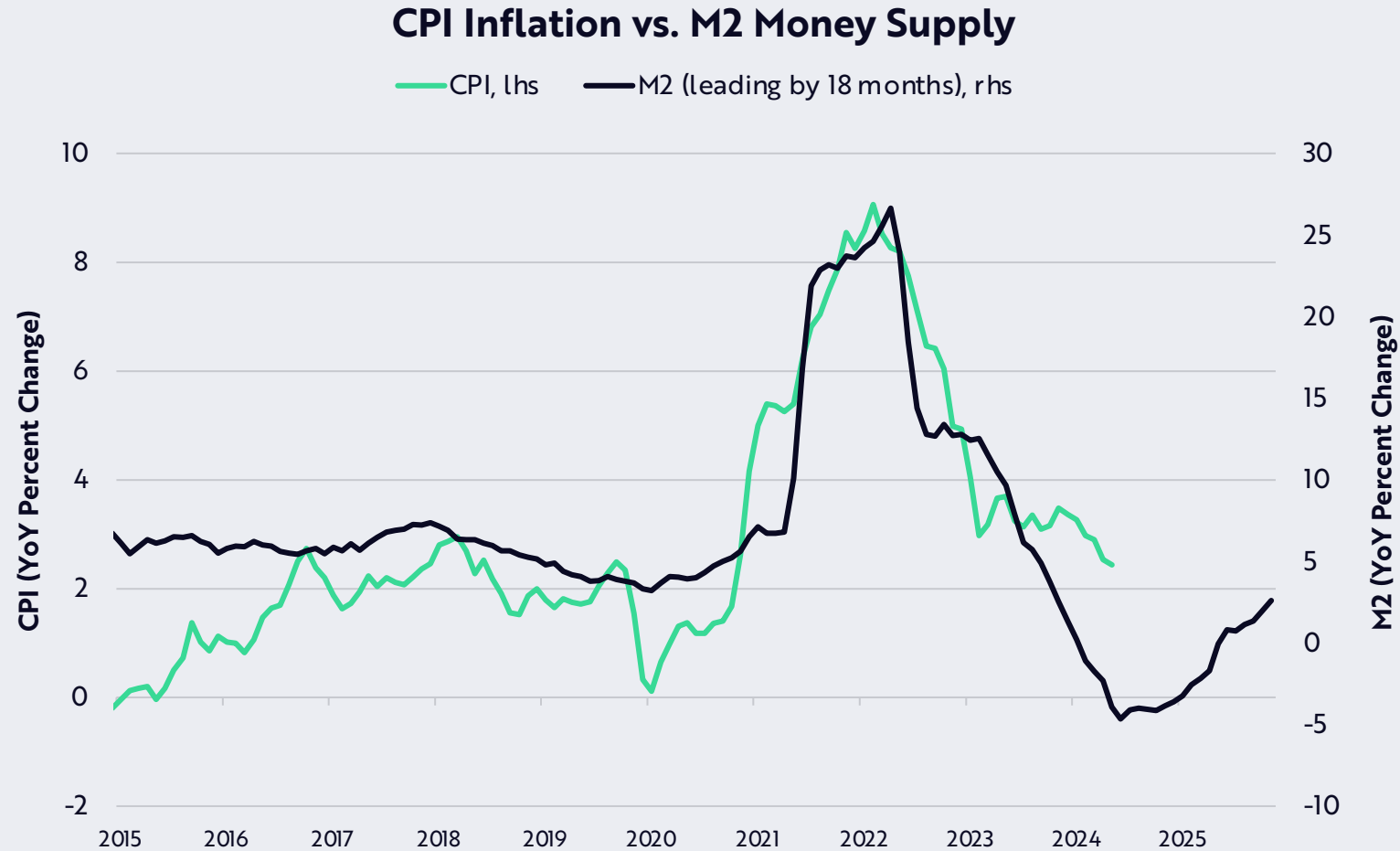
## ARK'S VIEW: NEUTRAL

- Introduced by President Lincoln in 1861 as a temporary measure to fund the Civil War, Congress passed the permanent personal income tax in 1909, and once ratified by the states in 1913, it became the 16th Amendment to the Constitution.
- Tax rates have stabilized since the 1990s.

[1] Per FRED, data is only available until 2018. ARK Investment Management LLC, 2024. Chart data from FRED. Information as of October 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. Forecasts are inherently limited and cannot be relied upon. Past performance is not indicative of future results.



# Money Supply Growth Has Led To Lower CPI Inflation



## ARK'S VIEW: BULLISH

- M2 growth has led CPI inflation by approximately 18 months, suggesting that consumer price inflation has additional room to slow.
- In 2020, a spike in the money supply preceded a significant increase in CPI inflation, highlighting their positive correlation.

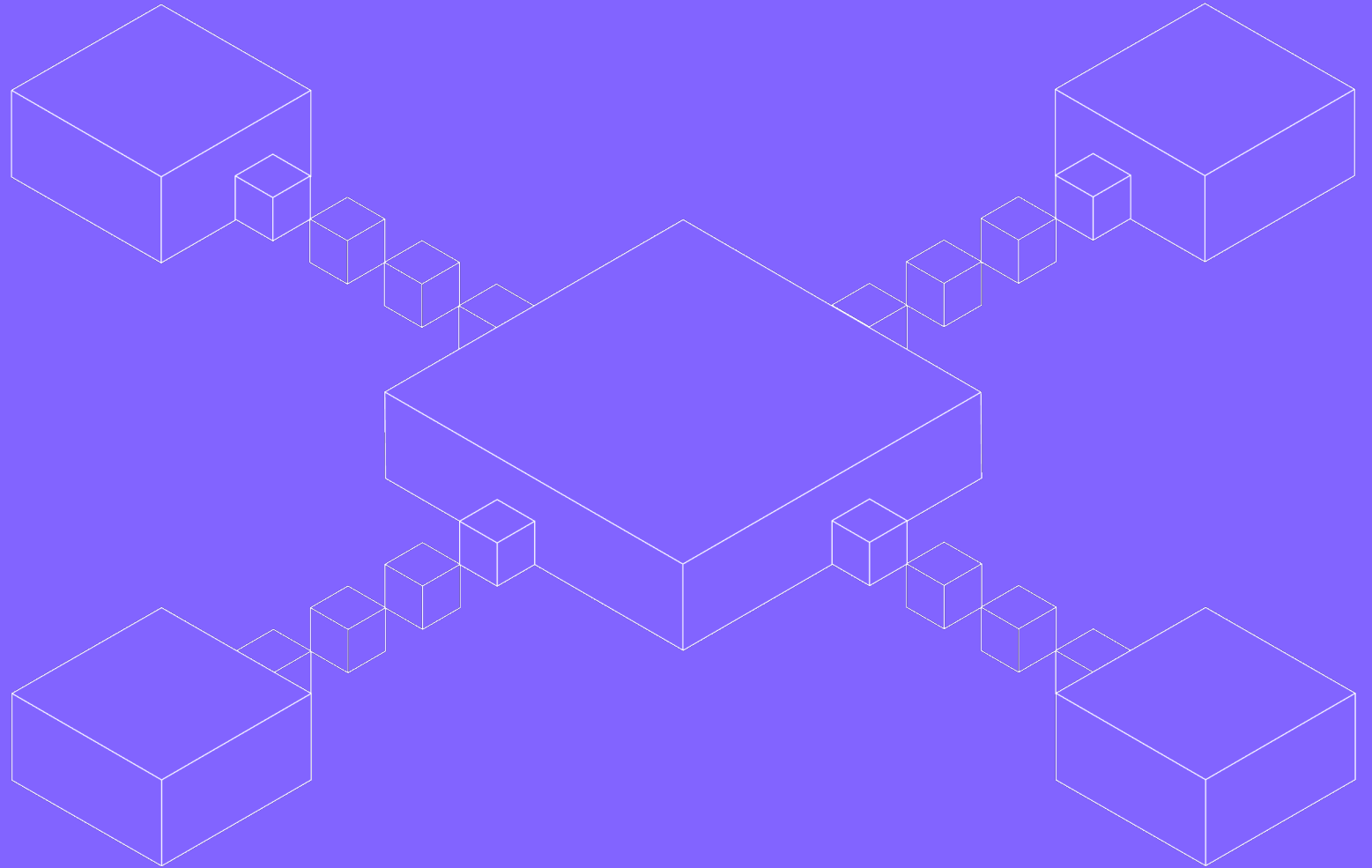
ARK Investment Management LLC, 2024. Chart data from FRED. Information as of October 31, 2024. For informational purposes only and should not be considered investment advice or a recommendation to buy, sell, or hold any particular security or cryptocurrency. Forecasts are inherently limited and cannot be relied upon. Past performance is not indicative of future results.



Section 04

---

# Appendix: Glossary Of Terms





# 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](http://www.ark-invest.com)**

**©2022-2026, ARK Investment Management LLC. No part of this material may be reproduced in any form, or referred to in any other publication, without the express written permission of ARK Investment Management LLC ("ARK").**

Please note, companies that ARK believes are capitalizing on disruptive innovation and developing technologies to displace older technologies or create new markets may not in fact do so and/or may face political or legal attacks from competitors, industry groups, or local and national governments.

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.

The content of this presentation is for informational purposes only and is subject to change without notice. This presentation does not constitute, either explicitly or implicitly, any provision of services or products by ARK and investors are encouraged to consult counsel and/or other investment professionals as to whether a particular investment management service is suitable for their investment needs. All statements made regarding companies or securities are strictly beliefs and points of view held by ARK and are not endorsements by ARK of any company or security or recommendations by ARK to buy, sell or hold any security. Historical results are not indications of future results. Certain of the statements contained in this presentation may be statements of future expectations and other forward-looking statements that are based on ARK's current views and assumptions and involve known and unknown risks and uncertainties that could cause actual results, performance or events to differ materially from those expressed or implied in such statements. The matters discussed in this presentation may also involve risks and uncertainties described from time to time in ARK's filings with the U.S. Securities and Exchange Commission. ARK assumes no obligation to update any forward-looking information contained in this presentation. Certain information was obtained from sources that ARK believes to be reliable; however, ARK does not guarantee the accuracy or completeness of any information obtained from any third party. ARK and its clients as well as its related persons may (but do not necessarily) have financial interests in securities or issuers that are discussed.

**ARK Investment Management LLC**