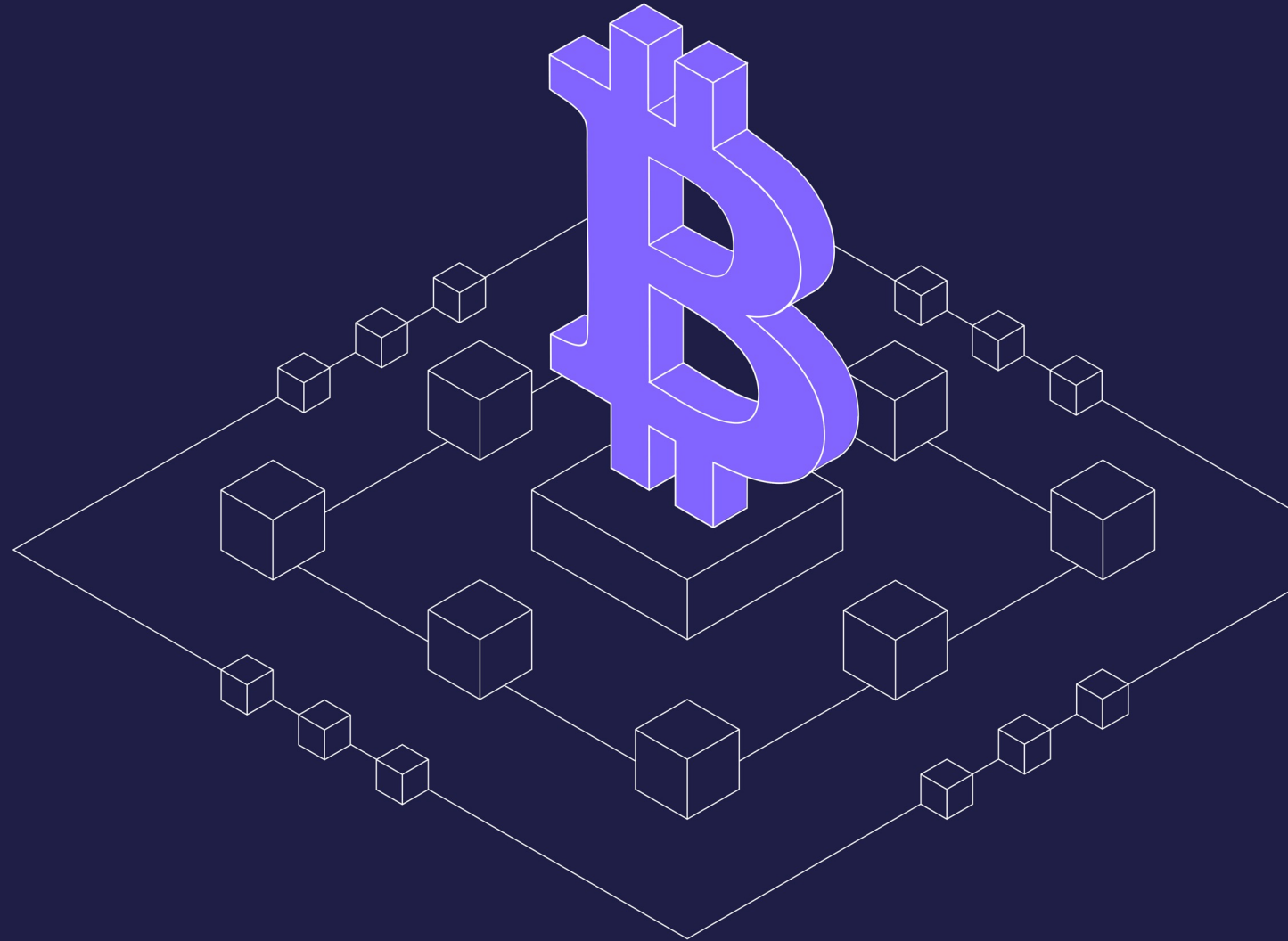




As of October 31, 2022

THE BITCOIN MONTHLY

THE LONGER THE BASE, THE MORE POWERFUL
THE BREAKOUT (OR BREAKDOWN)



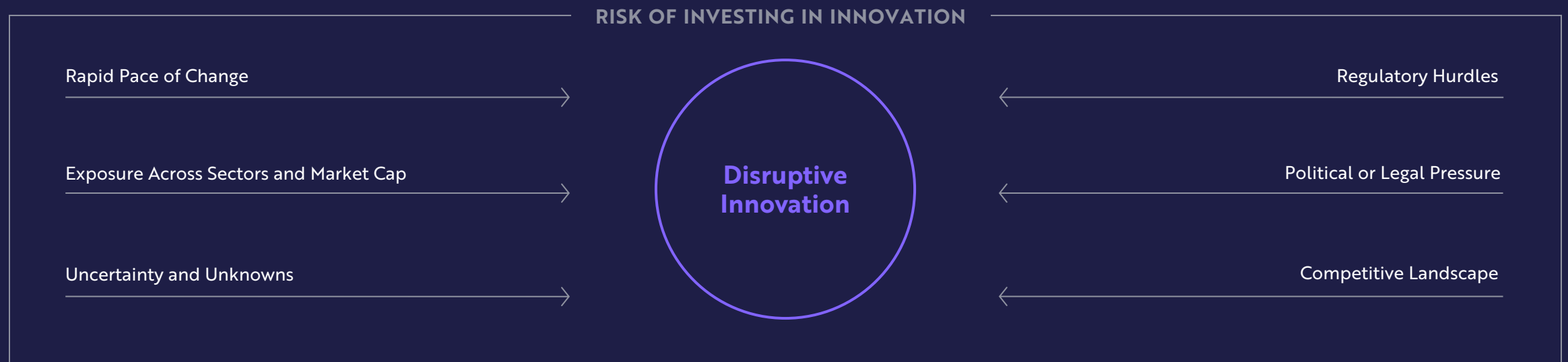
For Informational Purposes Only. ARK Investment Management LLC, 2022. This is not investment advice or a recommendation in relation to any named particular securities or cryptocurrencies and no warranty or guarantee is provided. Any references to particular securities or cryptocurrencies are for illustrative 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.**



RISKS OF INVESTING IN INNOVATION

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. ARK aims to educate investors and seeks to size the potential investment opportunity, 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 certain innovation areas.

Please read risk disclosure carefully.



→ Aim for a cross-sector understanding of technology and combine top-down and bottom-up research.

→ Aim to understand the regulatory, market, sector, and company risks. (See Risk and Disclosure Page)



SECTIONS

01

Market Summary

02

The On-Chain State of the Network

03

Bitcoin vs. Equities

04

Macro Stress

05

Appendix: Glossary Of Terms



Section 01

Market Summary





Bitcoin Continues To Trade In A Tight Range

On-Chain Activity

- Long-term holders are trading at a loss proportional to that of previous market cycles, suggesting that, finally, the highest-conviction participants are experiencing losses.
- Short-term holders are at breakeven for the first time since March. Historically, the level at which short-term holders are at breakeven has become "resistance" during bear market rallies.
- Miner balance sheets are underexposed to bitcoin relative to total market cap, suggesting that their selling pressure is and could be absorbed by buyers.

Macro

- Because of high and rising interest rates, mortgage-backed securities appear under as much pricing pressure as in the 2008 financial crisis.
- The personal saving rate is low and falling, suggesting that consumer spending is more dependent on debt.

ARK'S KEY TAKEAWAY

- For the third straight month, bitcoin is trading between support at its investor cost basis (\$18,814) and resistance at its 200-week moving average (\$23,460).
- Bitcoin's record low volatility suggests volatility, either upside or downside, will increase in the short term.
- Bitcoin appears to be faring better than some large-cap equities in the current risk-off environment.
- In an unfavorable macro environment, bitcoin appears more stable than major foreign currencies, including the euro and the British pound.

Source: ARK Investment Management LLC, 2022. Data from [Glassnode](#) unless otherwise specified. Data valid as of October 31, 2022, and subject to change. For more information on certain terms, please read our Appendix: Glossary Of Terms on page 23 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.



News Of The Month

<u>Core Scientific's stock tanks 75% as troubled bitcoin miner floats bankruptcy</u>	<u>USDC supply declined \$9 billion over the last three months</u>
<u>Celsius sets dates for asset auction following bankruptcy</u>	<u>Do Kwon says charges 'politically motivated'; refuses to reveal location</u>
<u>Apple updates App Store guidelines limiting NFTs And broader crypto functionality</u>	<u>FASB votes to use fair-value accounting for crypto on balance sheets</u>
<u>Crypto firm Genesis loses its chief risk officer</u>	<u>Google and Coinbase partner on plan to offer crypto payments for cloud services</u>
<u>Project Bluesky releases latest protocol design for decentralized social networking</u>	<u>Flashbots co-founder steps down after disagreements with team over censorship</u>
<u>Flashbots unveils upgrade that could resolve censorship concerns</u>	<u>Lido launches support for staked ETH on layer 2 integrations</u>
<u>Gensler supports granting CFTC more power over crypto commodity spot markets</u>	<u>FTX to launch Visa debit card in 40 new countries</u>
<u>Solana-based decentralized finance platform Mango hit by \$100 million exploit</u>	<u>Kim Kardashian charged by SEC for unlawfully promoting EthereumMax</u>
<u>Bored-Ape creator Yuga Labs faces SEC probe over unregistered offerings</u>	<u>NYDIG's CEO and President to step down</u>
<u>BNB Smart Chain hacked for over \$100 million</u>	
<u>Bitcoin miner Argo Blockchain shares plunge 40% as \$27M raise called off</u>	
<u>Compound DAO suspends four tokens with low liquidity as lending assets</u>	
<u>BitMEX CEO Alexander Hoepfner departs from the crypto futures exchange</u>	
<u>Coinbase launches USDC institutional rewards program with MakerDAO</u>	
<u>Fidelity Digital Assets to double headcount by end of year</u>	



Network Activity Is Showing Increasing Signs Of Health

	Bitcoin Metrics ¹	Unit	October 2022	1M Change	1Y Change	ARK's View	Upgrade/ Downgrade ³
Network Security	<u>Mining Difficulty</u>	Exahash/sec ¹ (Thousands)	158.2	+17.4%	+70%	Bullish	No Change
	<u>Miner Revenue</u> (7-Day Moving Average)	USD (Millions)	\$19.02	+1.7%	-69%	Neutral	↑
Network Usage	<u>Active Owners</u> ² (Active Entities, 7-Day Moving Average)	Thousands	251.6	+6.4%	-10.1%	Neutral	↑
	<u>Transaction Volume</u> ² (7-Day Moving Average)	BTC (Thousands)	178.4	-8%	+28.4%	Neutral	No Change
Holder Behavior	<u>Long-Term-Holder Supply</u> ² (Coins Held for 155 Days+)	BTC (Millions)	13.89	+1.2%	+2.7%	Bullish	No Change
	<u>Locked Supply</u> ² (Illiquid Supply)	BTC (Millions)	14.84	+0.9%	+5.8%	Bullish	No Change
	<u>Time-Weighted Turnover</u> ² (Coindays Destroyed, 7-Day Median)	Coindays (Millions)	7.97	-1.3%	-25.6%	Bullish	No Change

[1] For more information on these metrics and their units of account, please read the Appendix: Glossary of Terms on page 23 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.

Source: ARK Investment Management LLC, 2022. Data sourced from [Classnode](#). Some data may be subject to change over time since they are entity-adjusted in real time. Information as of October 31, 2022.

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.



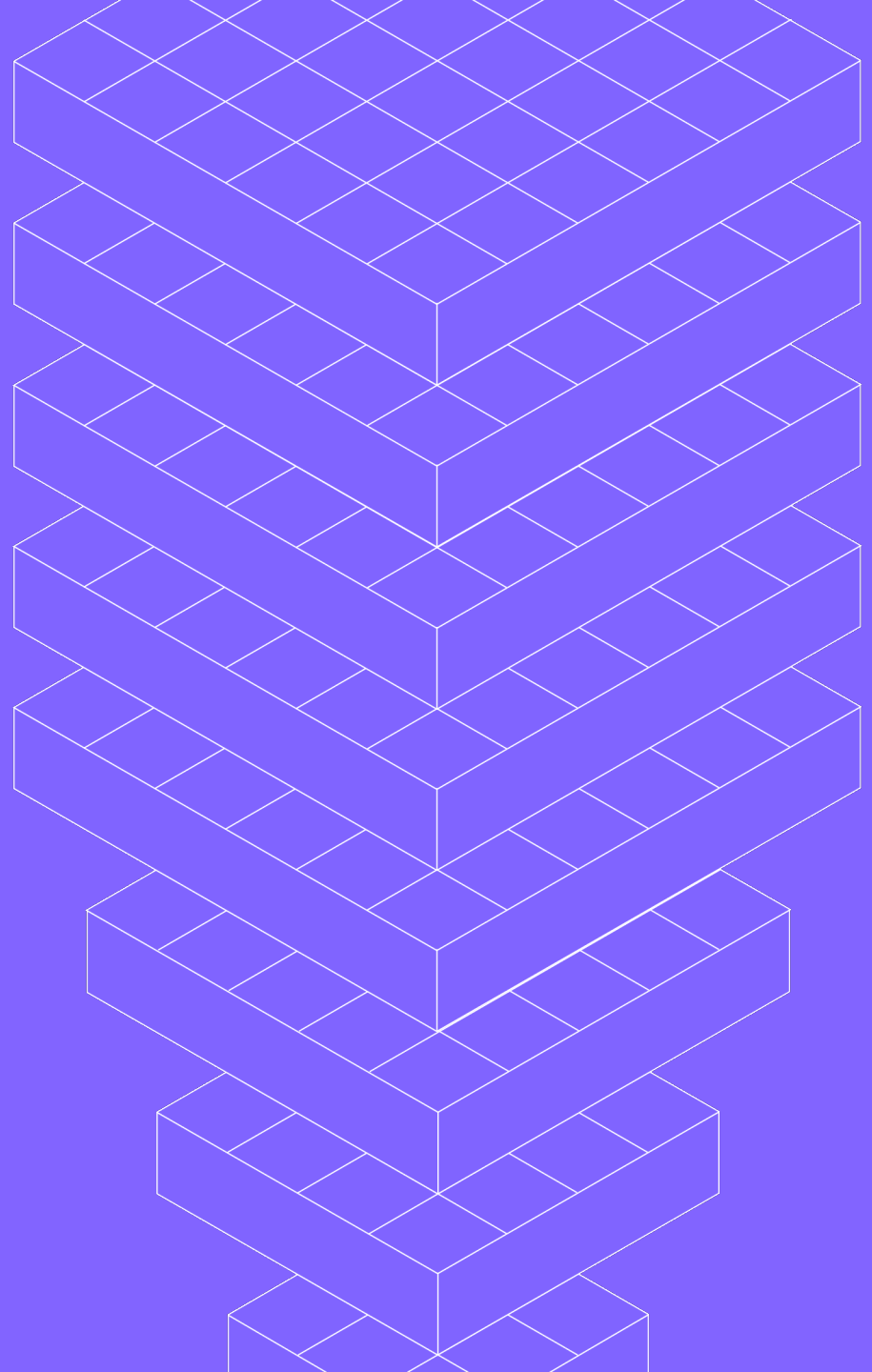
Bitcoin's Cost Base And Profitability Remain Stable

	Bitcoin Metrics ¹	Unit	October 2022	1M Change	1Y Change	ARK's View	Upgrade/ Downgrade ³
Long-Term Valuation	<u>Market Cost Basis</u> (Realized Price)	USD	\$21,105	-0.7%	-8.7%	Neutral	No Change
	<u>Percent Supply In Profit</u>	pp	58.7%	+5.1 pp	-36.8 pp	Bullish	No Change
Short-Term Valuation	<u>Short-Term-Holder Cost Basis²</u> (STH Realized Price)	USD	\$21,168	-5.7%	-56.2%	Bullish	No Change
	<u>Realized Market Returns²</u> (SOPR-1, 7-day moving average)	pp	-2.9%	-3.7 pp	-15.5 pp	Neutral	No Change
Market Sentiment	Perpetual Futures Basis (Binance, Estimated, 7-Day Exponential Moving Average)	pp	-0.03%	-0.02 pp	-0.07 pp	Bullish	No Change
	<u>Expirational Futures Basis</u> (Quarterly, All Exchanges, Annualized)	pp	1.56%	+0.77 pp	-12.1 pp	Bullish	No Change

[1] For more information on these metrics and their units of account, please read the Appendix: Glossary of Terms on page 23 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.

Source: ARK Investment Management LLC, 2022. 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, 2022. 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.

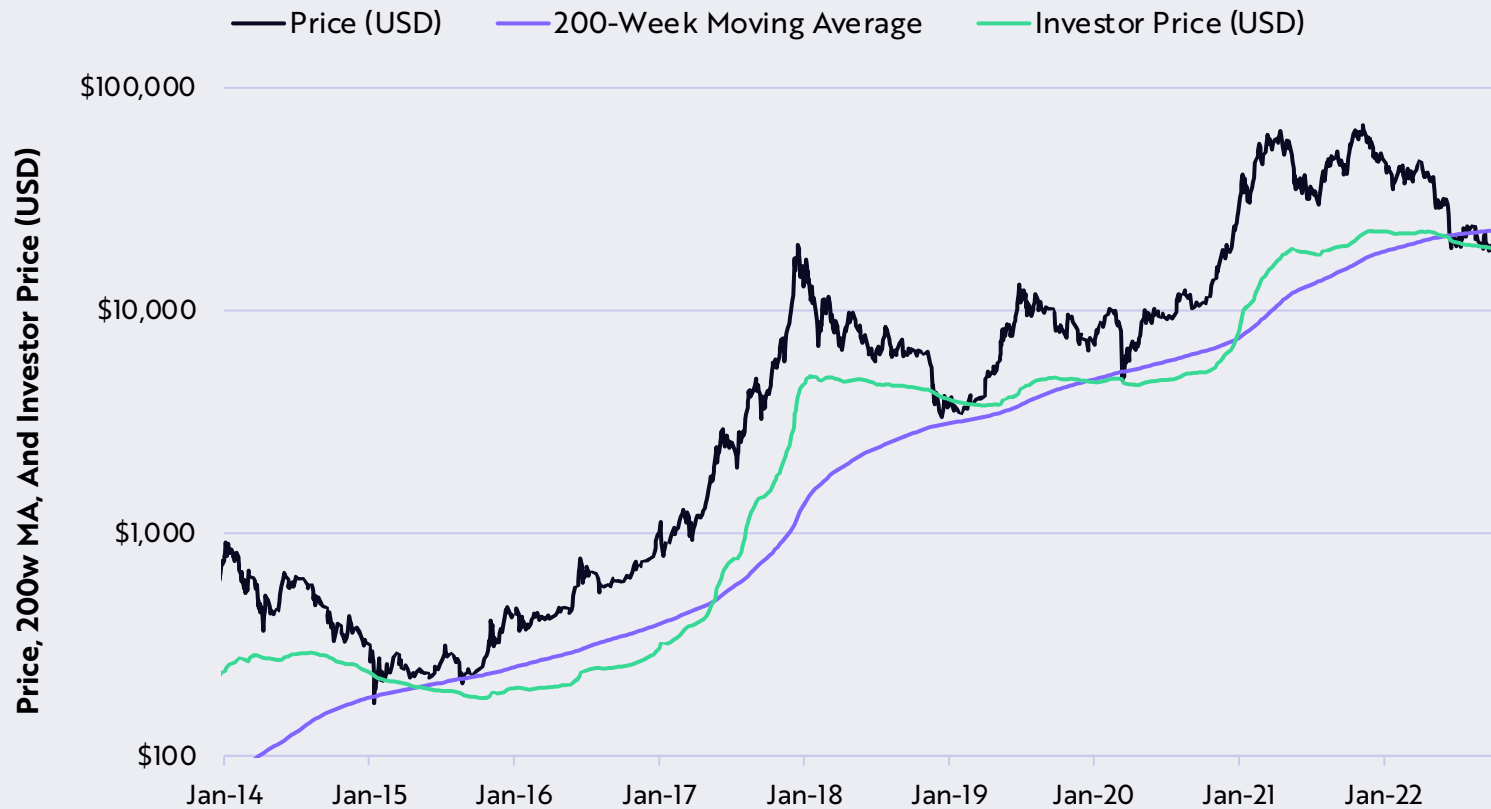
The On-Chain State Of The Network





Bitcoin Continues To Trade Between Its Investor Cost Basis And 200-Week Moving Average

Bitcoin 200-Week Moving Average and Investor Cost Basis



ARK'S VIEW: BULLISH

For the third month in a row, bitcoin continues to trade between support at its investor cost basis (\$18,814) and resistance at its 200-week moving average (\$23,460).

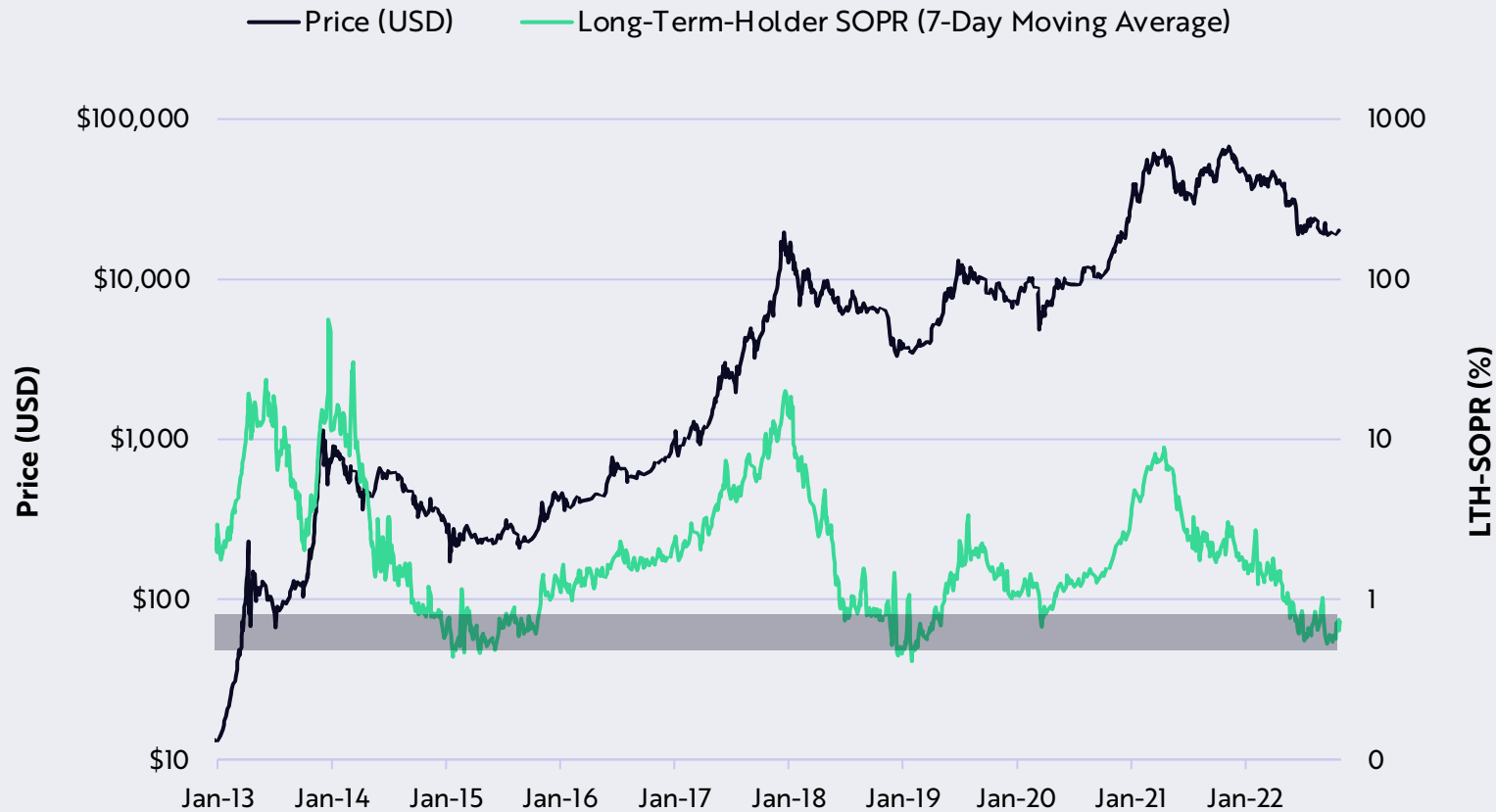
The former, calculated by removing the miner cost basis from the general cost basis of the market, has remained strong support while bitcoin finds itself in a tug of war between oversold on-chain conditions and a chaotic macro environment.

Given the tight range bitcoin has traded between in the last quarter, an expansion in volatility should be expected in the following weeks to months.



Long-Term Holders Are Trading At A Loss Proportional To That Of Previous Market-Cycle Bottoms

Bitcoin Long-Term-Holder Spent Output Profit Ratio (LTH-SOPR)



ARK'S VIEW: BULLISH

Long-term holders (LTH) appear to be trading at losses proportion to that of the 2015-2016 and 2018-2019 bear markets, suggesting strong capitulation.

LTH-SOPR, currently standing at 0.5, is the ratio between the aggregate price sold and the aggregate price bought of coins held by long-term market participants. A ratio of 0.5 suggests that on average, long-term-holder participants are incurring nearly 50% losses, making apparent that even the most patient are under financial punishment.

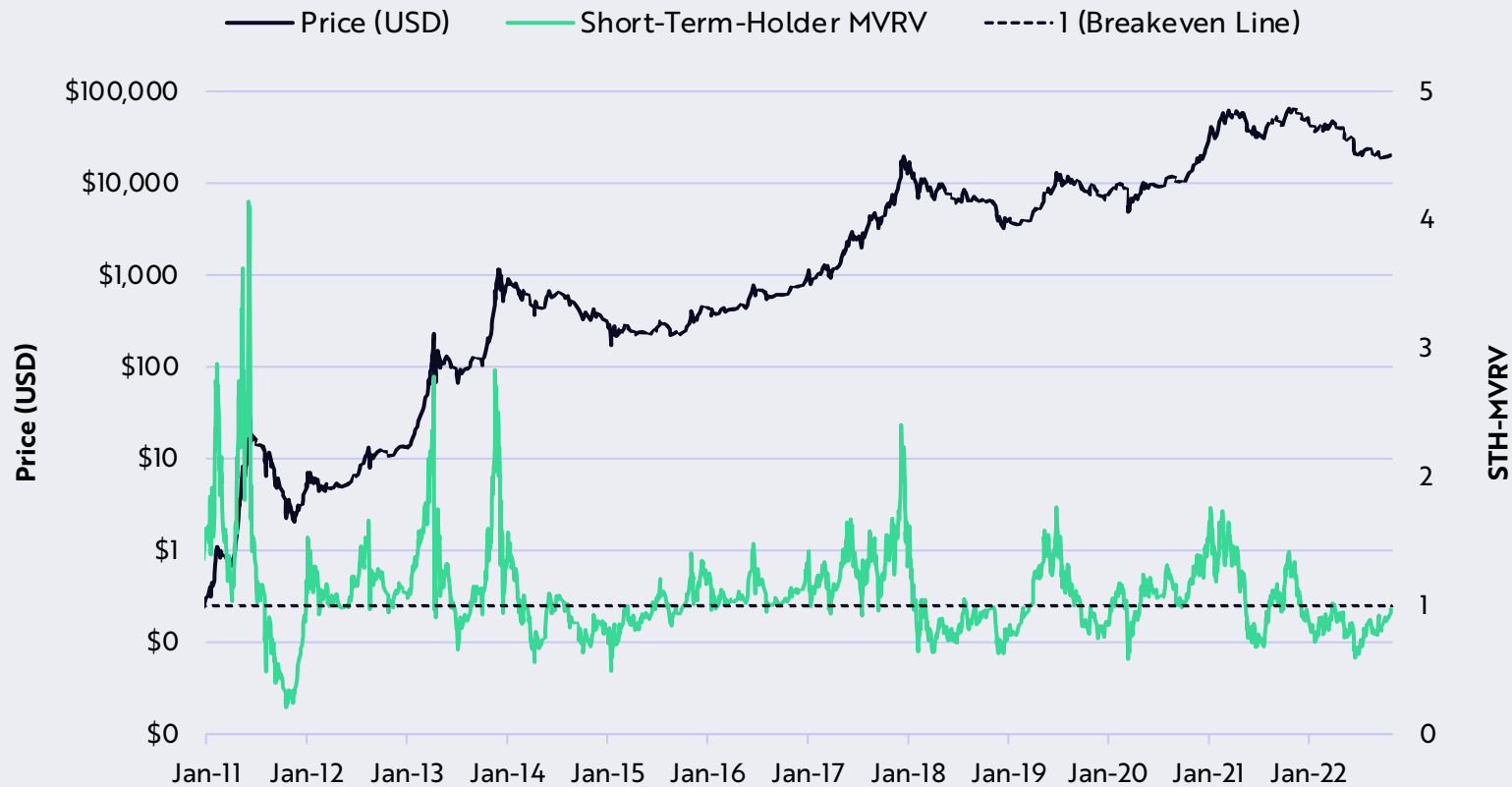
A return of this metric back to or above 1 could suggest that long-term holders are in profit, signaling the start of a new bullish trend.

Source: ARK Investment Management LLC, 2022. Data from [Glassnode](#). Information as of October 31, 2022. Data may be subject to change over time since they are entity-adjusted in real time via a proprietary machine learning algorithm. 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.



Short-Term Holders Are At Breakeven, Facing Resistance

Bitcoin Short-Term-Holder MVRV



ARK'S VIEW: BEARISH

The short-term holder (STH) cohort, defined as holders who have transacted in the last 155 days, is currently trading at breakeven and could face resistance.

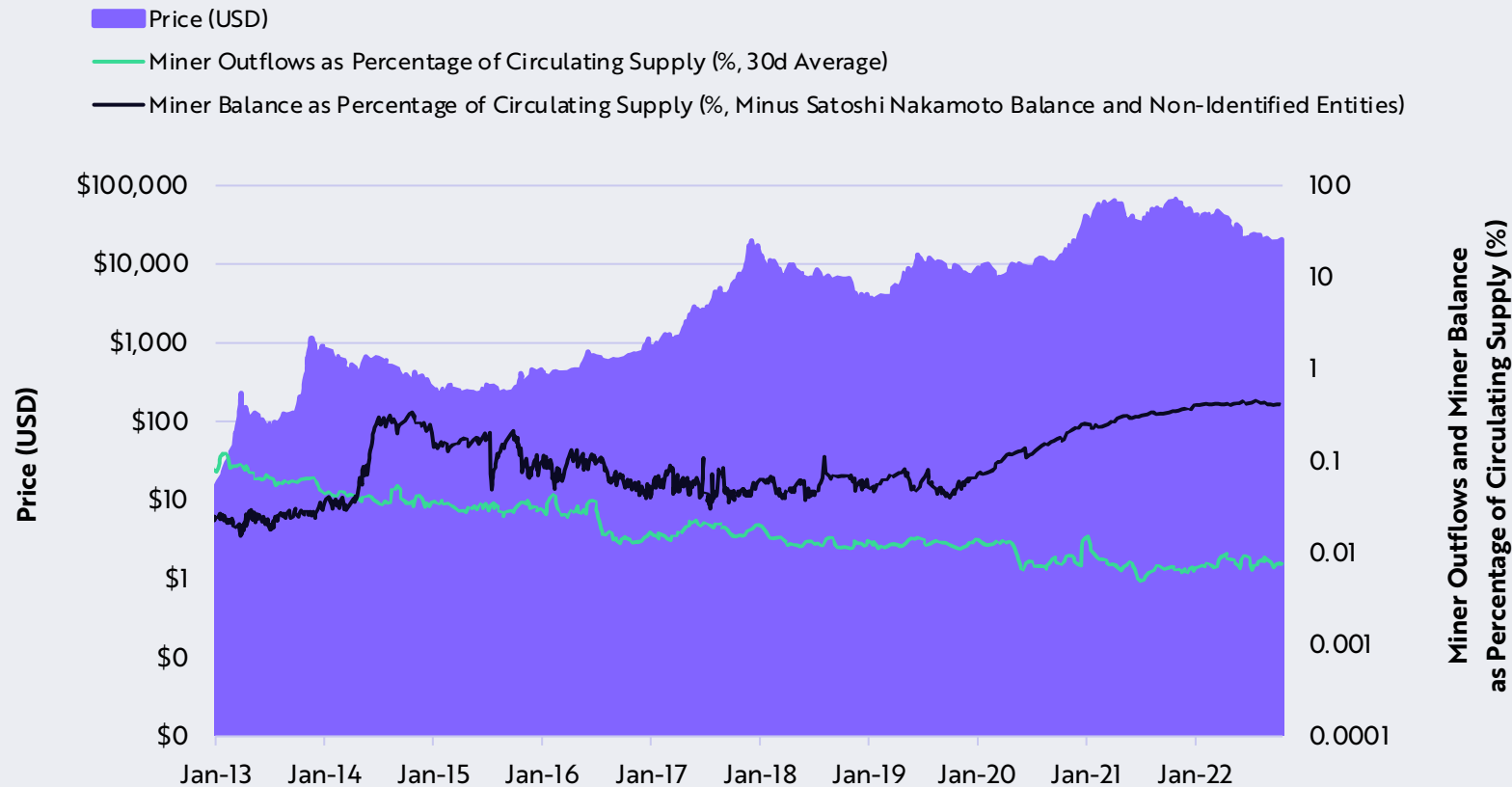
For perspective, the last time STH-MVRV approached 1 was at the local price top at \$47,450 of March 30 earlier this year. Currently near the level of 1, this metric stands at a crucial threshold for bulls to show dominance over bears for the first time since the start of 2022.

Source: ARK Investment Management LLC, 2022. Data from [Glassnode](#). Information as of October 31, 2022. Data may be subject to change over time since they are entity-adjusted in real time via a proprietary machine learning algorithm. 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.



Despite The Pressure Miners Are Facing, Their Bitcoin Balances Are Increasing

Bitcoin Miner Outflows And Miner Balance As Percentage Of Circulating Supply



ARK'S VIEW: BULLISH

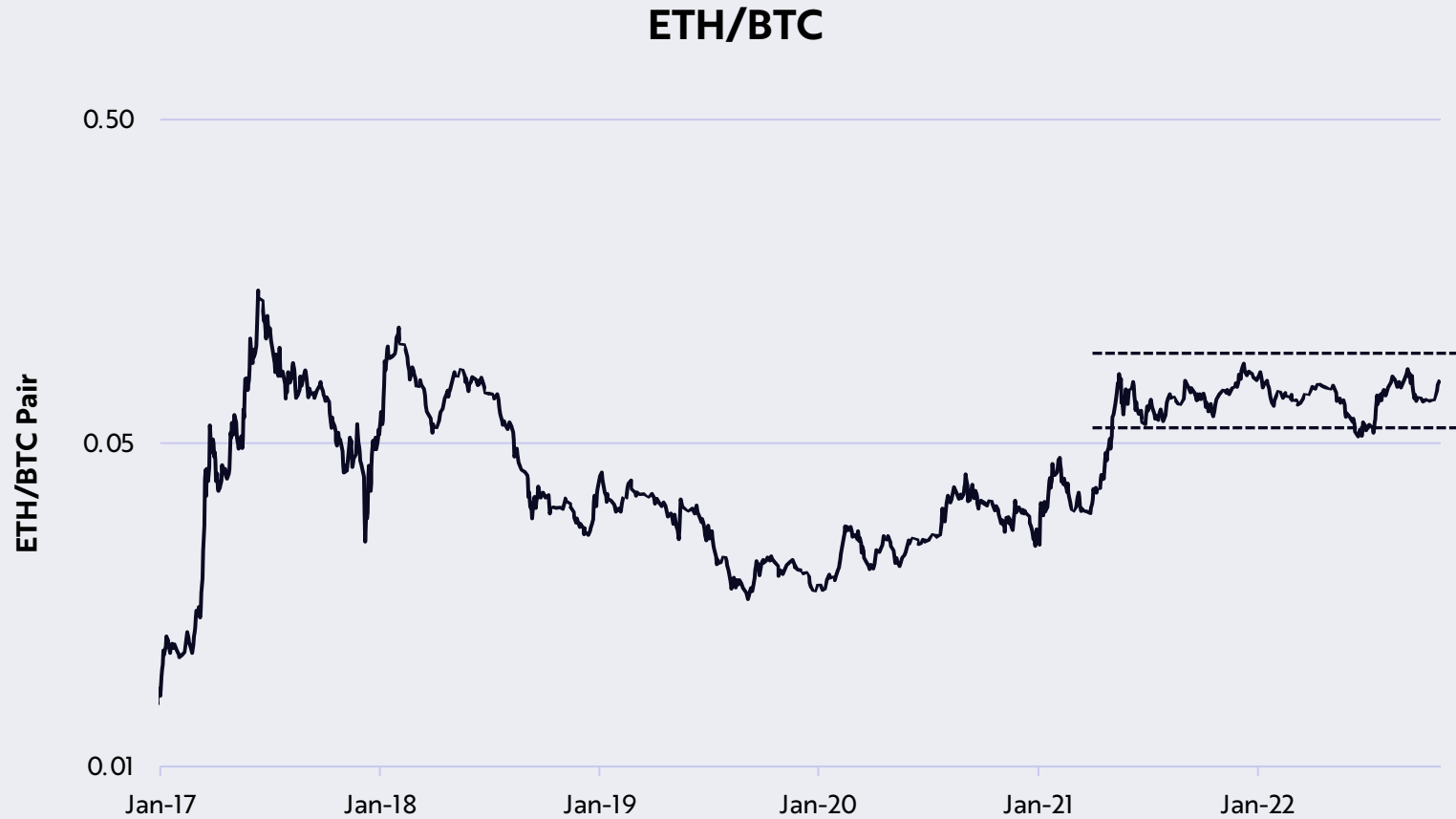
Despite miners facing pressure from increasing hash rate and decreasing prices, their selling pressure seems to remain muted, as measured by their balance sheet and outflows.

For context, miner outflows on a 30-day average make up less than 0.01% of circulating supply per day; adjusted miner balance, although making new highs in Q3, 2022, remains below 1% of circulating supply at 0.41%.

[1] Adjusted miner balance here is composed by most of known entities and pools in the bitcoin miner industry. By calculation, Satoshi Nakamoto's coins (a.k.a. "Patoshi") and non-identified entities are subtracted from the total balance, since these are inferred by ARK to be coins lost or from miners with lower probability to spend. Source: ARK Investment Management LLC, 2022. Data from [Classnode](#). Information as of October 31, 2022. Data may be subject to change over time since they are entity-adjusted in real time via a proprietary machine learning algorithm. 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.



ETH Outperformed BTC In October, Suggesting Growing Risk-On Sentiment Across Crypto Markets



ARK'S VIEW: BULLISH

The ETH/BTC pair continues to trade between its 2-year trading range.

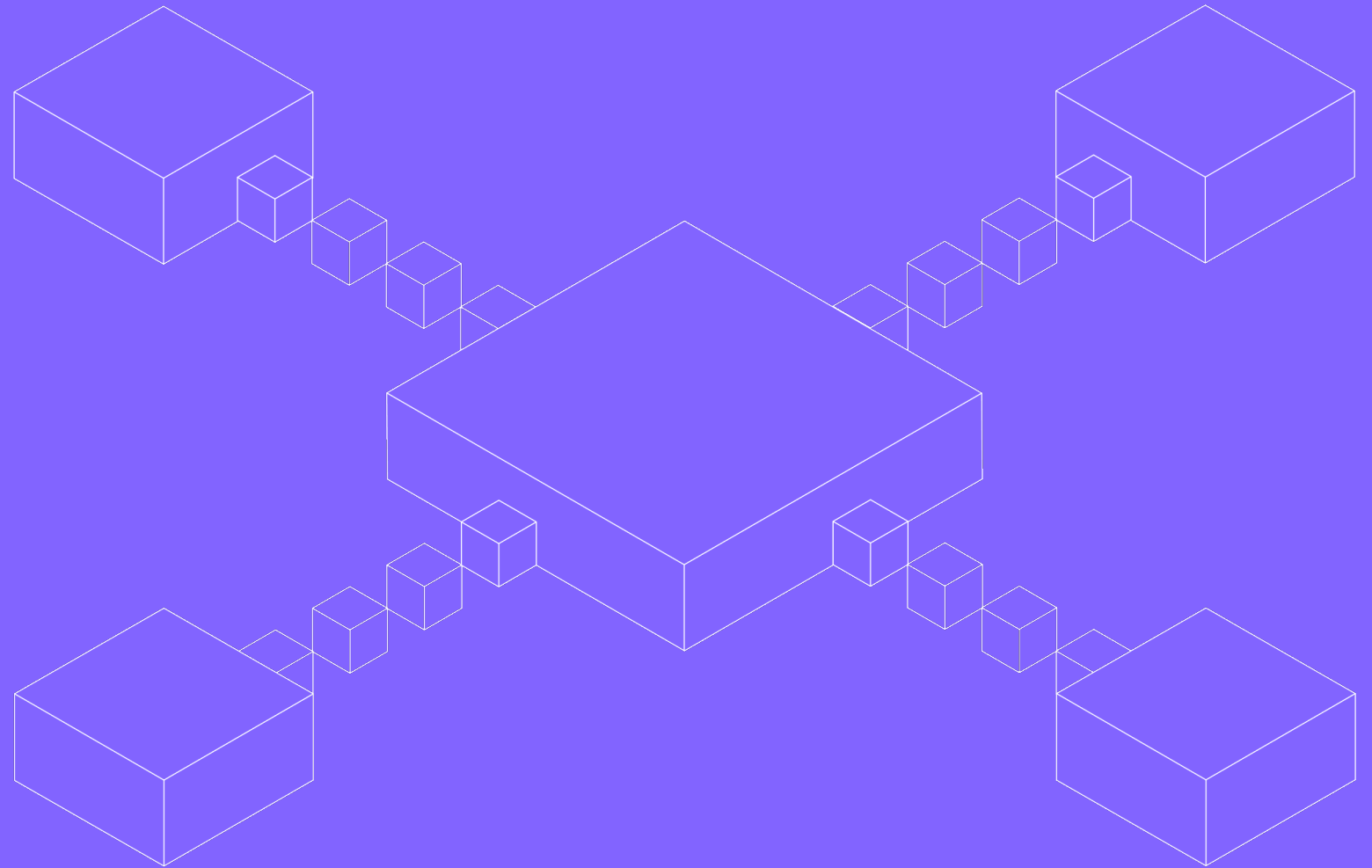
Ether has outperformed bitcoin by 12.28% this month, approaching the top of this trading range.

Ether's relative strength suggests an increase in "risk-on" sentiment in the crypto market.



Section 03

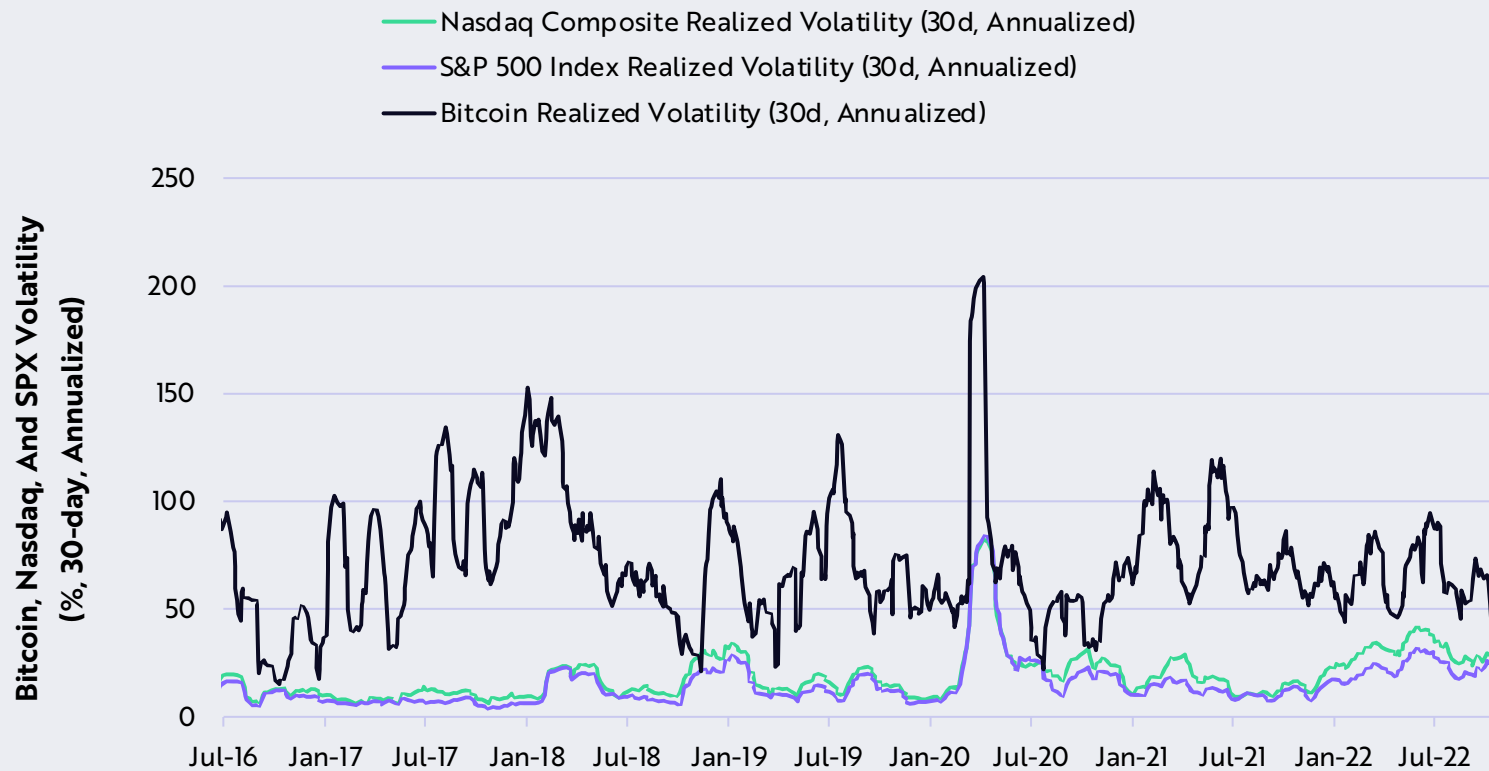
Bitcoin vs. Equities





Bitcoin's Volatility Has Declined In The Face Of Heightened Equity Volatility

Bitcoin, Nasdaq Composite, And S&P 500 Index 30-Day Volatility



ARK'S VIEW: NEUTRAL

Bitcoin's 30-day volatility is on par with the Nasdaq's and the S&P 500's for the first time since 2020.

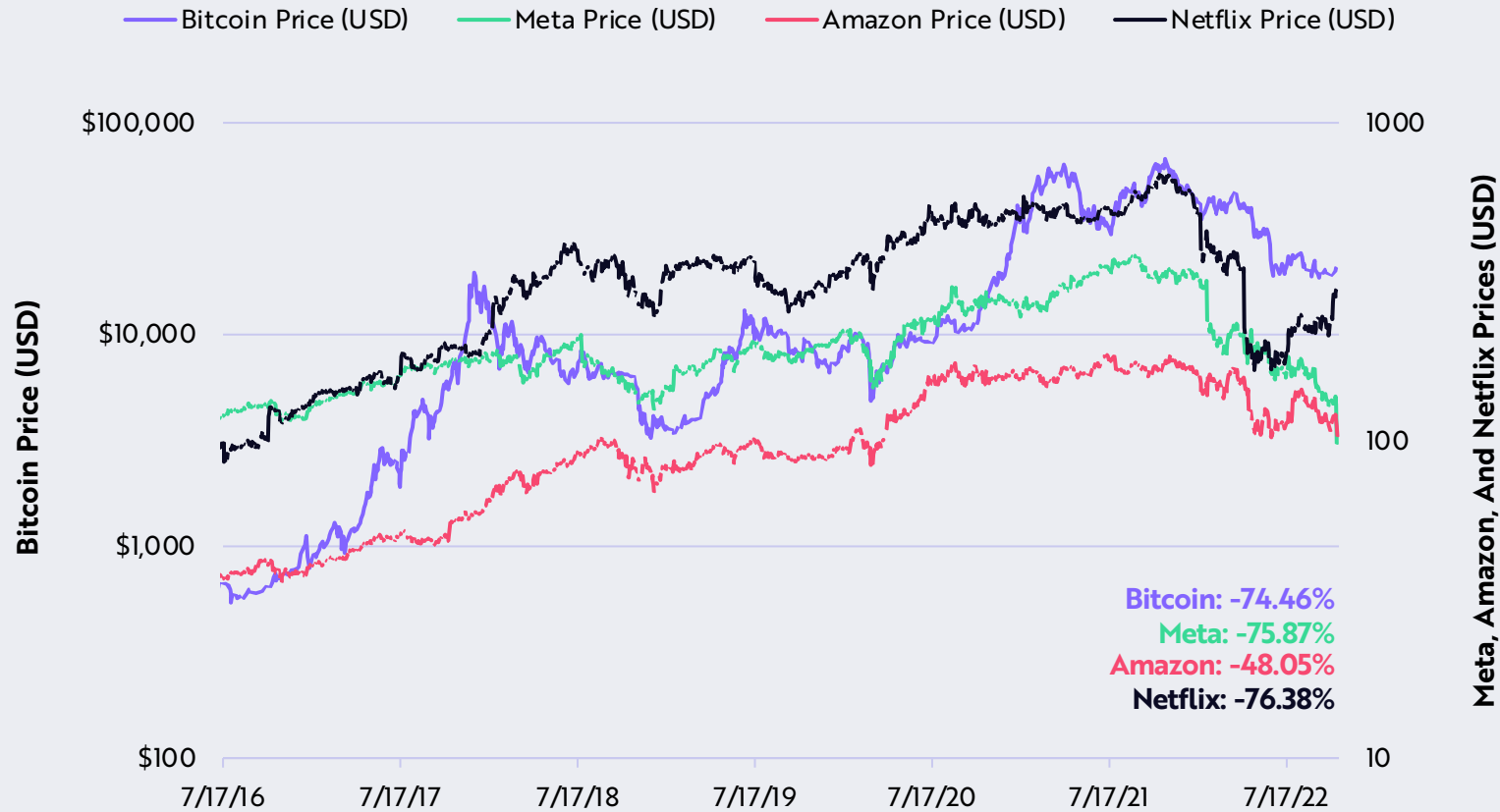
The last time bitcoin's volatility declined and equaled the rising volatility of equity indices was in late 2018 and early 2019, preceding bullish moves in the BTC price.

Source: ARK Investment Management LLC, 2022. Data from TradingView.com. Information as of October 31, 2022. 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.



Several FAANGs Have Underperformed Bitcoin From Peak To Trough

Bitcoin, Meta, Amazon, and Netflix Prices



ARK'S VIEW: NEUTRAL

The price drawdowns from all-time high in Meta (-75.87%) and Netflix (-76.38) have exceeded that of bitcoin's (-74.46%). To a lesser extent, Amazon also suggests a correction proportional to that of BTC's "usual" volatility (-48.05%).

Although further drawdown in the crypto markets remains a possibility, the relative strength of bitcoin to major components in traditional Big Tech baskets suggests the severity of the macroeconomic environment and bitcoin's resilience against it.

Source: ARK Investment Management LLC, 2022. Data from TradingView.com. Information as of October 31, 2022. 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.



Section 04

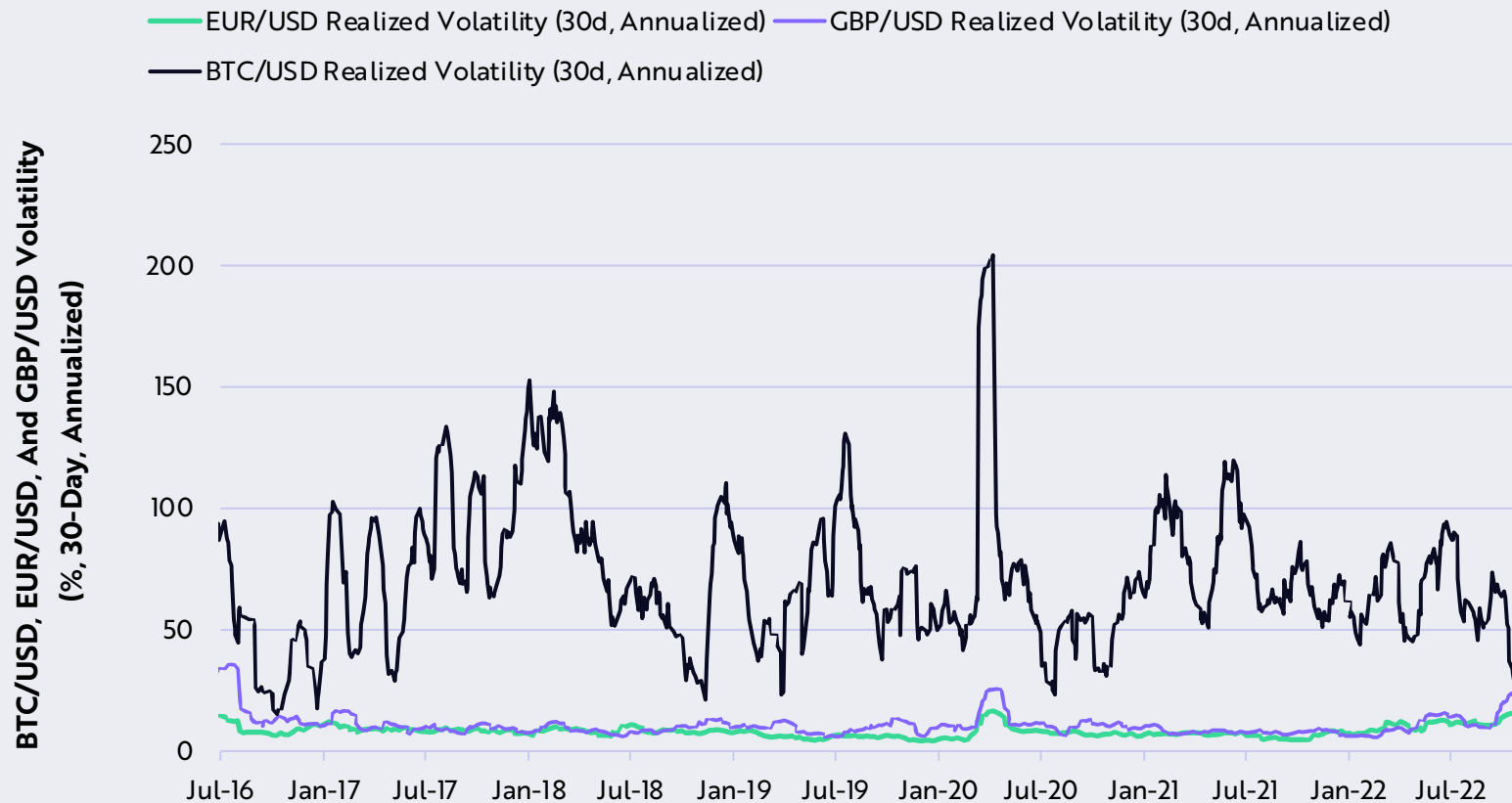
Macro Stress





BTC/USD Is More Stable Today Than The EUR/USD And GBP/USD During The COVID-19 Crisis

BTC/USD, EUR/USD, and GBP/USD 30-Day Volatility



ARK'S VIEW: NEUTRAL

Bitcoin's relative volatility has not only decreased relative to equities, but also to major currency pairs.

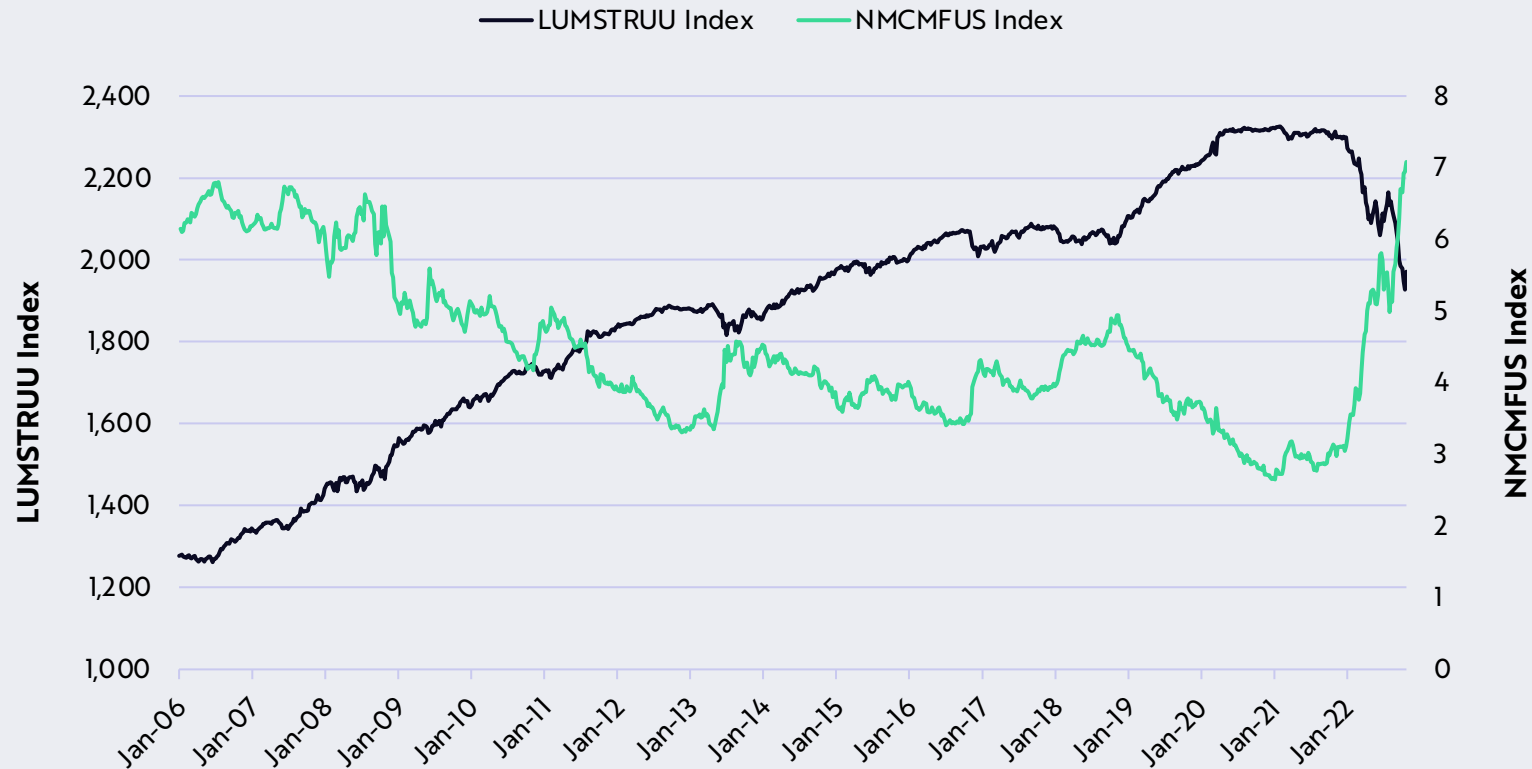
As macro uncertainty and USD strength have increased, foreign currency pairs have been impacted negatively while bitcoin has been relatively stable. Bitcoin's 30-day realized volatility is nearly equivalent to that of the GBP and EUR for the first time since October 2016.

Although Fed hawkishness could continue its volatility, bitcoin's strength relative to foreign currencies is an encouraging sign.



Mortgage-Backed Securities Are Under More Duress Today Than In The 2008 Housing Crisis

US MBS Index Total Return Value Unhedged USD (LUMSTRUU) and the Freddie Mac Primary Mortgage Market Survey (NMCMFUS)



ARK'S VIEW: BEARISH

Mortgage-backed securities seem to be pricing for distress in the US housing market.

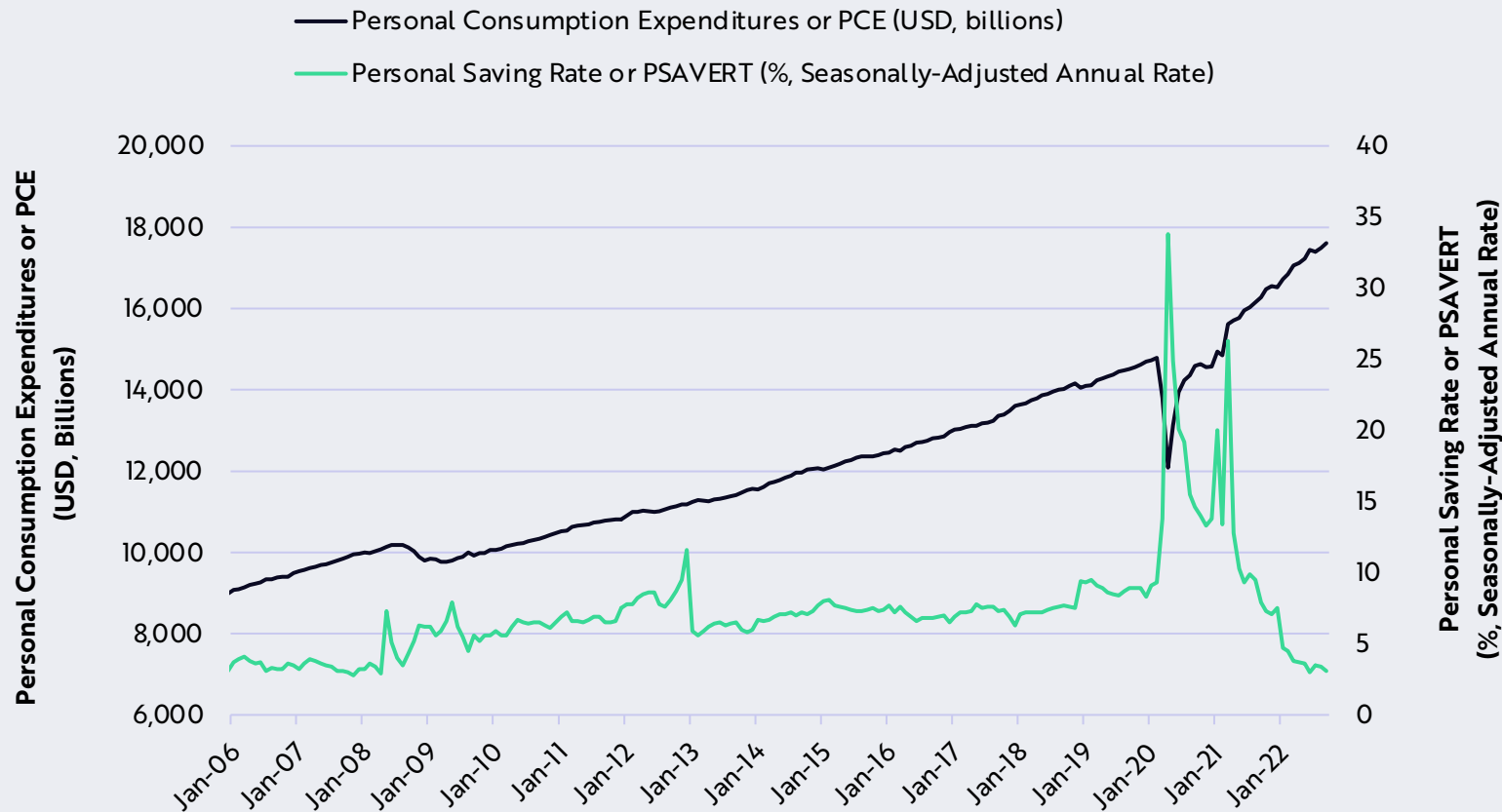
The Freddie Mac Primary Mortgage Market Survey (PMMS) increased to levels higher than those during the 2008 financial crisis.

Furthermore, US MBS Index Total Return Value Unhedged USD has depreciated 16.7% decrease on a year-over-year basis, pointing to value destruction in the housing market during the past year.



A Collapse In The Personal Saving Rate Suggests That Consumer Spending Is Dependent On Debt

Personal Consumption Expenditures and Personal Saving Rate



ARK'S VIEW: NEUTRAL

As consumer spending continues to increase, a collapse in the personal saving rate to 3.1% suggests that the consumer is relying more on debt than income for funding.

Rising personal debt and depressed savings could put pressure on the Fed to pivot from its hawkish stance.



Section 05

Appendix: Glossary Of Terms





Glossary of Terms

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

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

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

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.

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

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.

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 to remain unmoved increases drastically.

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.

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

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.

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: 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 and 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.

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

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

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.



For more research on disruptive innovation visit 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