

Bloomberg Crypto Outlook

Transitioning Bitcoin Bull

- The Bitcoin Bull Is Transitioning and Maturing Toward Boredom
- Resting Bulls Caged: Bitcoin \$8,000-\$10,000, Gold \$1,600-\$1,700
- Bitcoin Price, Maturity Supported Via Institutional Adoption
- Bitcoin Primary On-Chain Indicators Hold a Price-Positive Course

Bloomberg Professional Services

Indices

Bloomberg

CONTENTS

- 3** Overview
- 3** Bitcoin's Friendly Trends
- 5** Increasing Bitcoin Adoption
- 6** Positive On Chain Indicators

Data and outlook as of March 5, 2019

Mike McGlone - BI Senior Commodity Strategist

[Learn more about Bloomberg Indices](#)

[BI COMD](#) (the commodity dashboard)

Note - Click on graphics to get to the Bloomberg terminal

The Bitcoin Bull Is Transitioning and Maturing Toward Boredom

Performance: Bloomberg Galaxy Crypto Index (BGCI)

February +2%, 2020 to March 5 +50%, One-year +55%

Bitcoin February -7%, 2020 +28%, One-year +138%

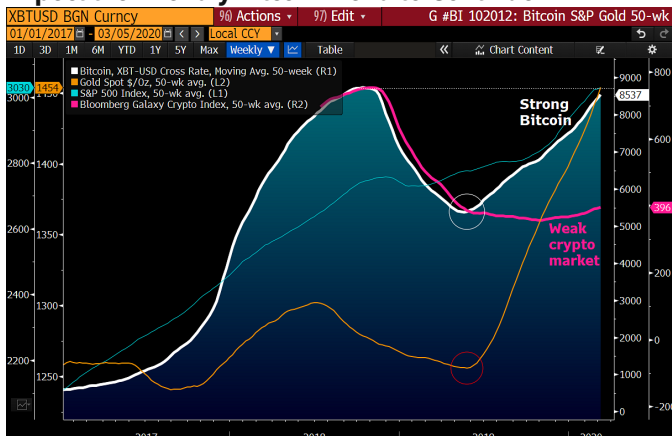
(Bloomberg Intelligence) -- It won't be clear where Bitcoin prices are headed in the near term until they sustain above \$10,000 or below \$8,000, and supporting factors suggest the high end is more likely, in our view. Bitcoin is evolving to a digital version of gold from a risk-on asset. Somewhat stuck between the stock market and gold recently, we expect Bitcoin to keep doing what it has for most of its history -- appreciating -- particularly with daily supply soon to be halved. Increasing adoption and macroeconomic forces similar to those supporting gold should keep a bid under Bitcoin.

Our outlook is less favorable for the broader crypto market, and we expect appreciation only to the extent that Bitcoin can provide a boost. The Bloomberg Galaxy Crypto Index is up about 50% in 2020, about double that of Bitcoin and indicating a bullish tilt.

Bitcoin's Friendly Trends

Resting Bulls Caged: Bitcoin \$8,000-\$10,000, Gold \$1,600-\$1,700. Supported by similar favorable fundamental and technical factors as gold, the Bitcoin price is more likely to keep increasing, in our view. As the crypto transitions from more of a risk-on asset akin to the stock market toward a digital store-of-value, it's important to focus on the underlying trends, which remain positive.

Expect the Friendly Bitcoin Trend to Continue

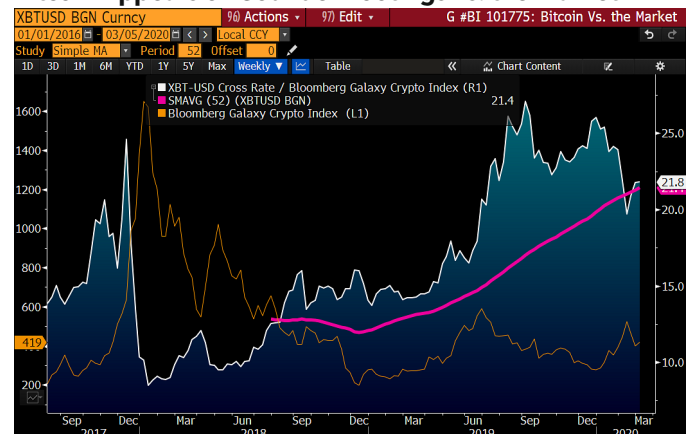


Staying the Upward Course for Bitcoin. Bitcoin's price trajectory is upward with minimal potential for reversal, in our view. Idling at about \$8,000-\$10,000 recently, the first-born crypto appears to be marking time. Our graphic of Bitcoin, gold and S&P 500 50-week averages depicts the upward biases. Without sustained reversals in the fundamental forces driving these trends, it seems illogical to expect anything other than staying the course. A primary outlier is a moribund broad crypto market, as measured by the Bloomberg Galaxy Crypto Index.

Over-supplied and highly speculative, the crypto market is unlikely to appreciate absent higher Bitcoin. The 50-week mean of the benchmark crypto at about \$8,500 is near its all-time high of \$8,740 from 2018. At almost \$9,000, the 2020 average annual Bitcoin price to March 5 is the highest ever.

Bitcoin Is Digital Gold vs. Speculative Cryptos. Relative to the broader crypto market, Bitcoin has returned to a favorable relative value, in our view. Indicating overall bullishness, the Bloomberg Galaxy Crypto Index (BGCI) has increased about 50% in 2020 to March 5, vs. about half that for Bitcoin, but the spurt in alt coins appears more fleeting and speculative against the firming foundation of interest in Bitcoin. Since peaking about two years ago, the BGCI is down about 80% vs. 50% for Bitcoin.

Bitcoin Appears on Sounder Footings vs. the Market



Our graphic depicts the Bitcoin-to-BGCI ratio dipping below its upward-sloping 52-week moving average for the first time since 2Q18, along with what looks like a more enduring decline for other cryptos. Most alt coins lack the indications of widespread store-of-value adoption that are evident in Bitcoin.

Bitcoin Set to Prevail vs. Other Cryptos. The broad crypto-market spurt in 2020 vs. Bitcoin should be temporary and tilt back toward the first born, in our view. Endurance favors Bitcoin, which is becoming more a digital version of gold. Our scorecard shows the benchmark being topped on one-year basis by only Bitcoin Cash. The highly speculative hard fork pales in comparison to the original Bitcoin when it comes to widespread adoption.

Indicating the enduring hangover of the broader market, the Digital Assets Small Cap Index is down about 20% on a one-year basis, vs. an almost 140% gain in Bitcoin. Over 5,000 cryptos are listed on Coinmarketcap compared with about 1,500 two years ago. Bitcoin adoption is increasing, while the alt-coin market battles over the latest new-and-improved entrants.

Bitcoin, Gold Advancing with Declining Yields

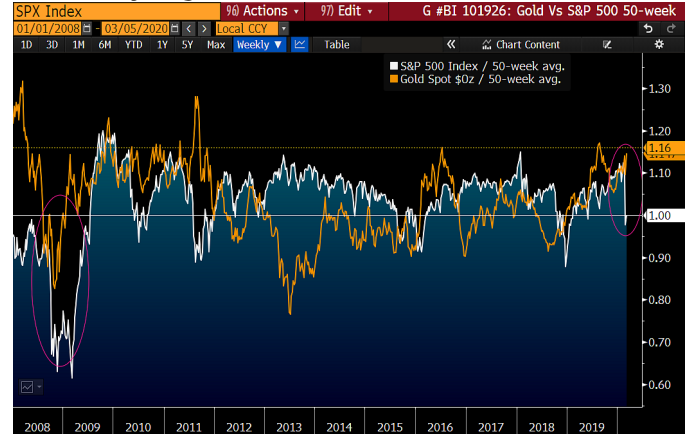
Name	1 Mth % Change	3 Mth % Change	YTD % Change	11 Yr % Change	2 Yr % Change
Bloomberg Galaxy Crypto Index					
Bloomberg Galaxy Crypto Index (BGCI)	544	-3.4	35.6	49.8	55.4
USD Cross					
Bitcoin Cash (BCH)	799	-21.1	61.3	67.9	162.5
Bitcoin (BTC)	455	-5.9	23.5	27.3	137.6
Ethereum Classic (ETC)	511	-31.1	124.5	91.0	100.3
Ethereum (ETH)	422	12.6	56.9	81.2	72.2
Monero (XMR)	622	-10.2	29.6	56.7	41.7
Litecoin (LTC)	485	-13.7	41.3	52.9	21.9
Dash (DASH)	553	-24.2	83.3	123.2	10.3
Zcash (ZEC)	553	-25.5	72.9	89.8	4.0
EOS (EOS)	688	-15.6	43.2	48.7	2.8
Ripple (XRP)	422	-12.7	9.0	27.3	-22.4
MVIS CryptoCompare Indices					
Single Asset Indices					
Bitcoin Cash (BCH)	799	-21.6	63.5	67.5	162.2
Bitcoin OTC (BTC)	455	-6.1	23.3	27.3	137.3
Bitcoin (BTC)	455	-6.2	24.6	26.8	134.7
Ethereum Classic (ETC)	511	-32.9	122.1	86.8	90.9
Ethereum (ETH)	422	12.0	58.1	79.9	72.0
NEO (NEO)	511	-3.3	43.9	41.8	42.4
Monero (XMR)	622	-10.6	31.9	56.4	41.3
NEM (XEM)	421	-1.6	51.5	67.0	26.5
Litecoin (LTC)	485	-14.1	42.3	52.6	20.4
Dash (DASH)	553	-24.8	83.7	122.9	16.0
Zcash (ZEC)	554	-25.8	82.6	89.4	2.6
Iota (MIOTA)	596	-28.6	18.4	47.1	-19.7
Ripple (XRP)	422	-12.8	11.8	27.1	-23.3
Multi-Asset Indices					
Digital Assets 100 Large Cap	455	-5.4	29.7	34.7	92.2
Digital Assets 100	455	-5.3	30.4	35.3	85.6
Digital Assets 5	444	-3.7	37.5	48.4	68.6
Digital Assets 10	455	-5.4	39.8	50.7	59.8
Digital Assets 25	577	-4.0	52.3	62.1	51.8
Digital Assets 100 Mid Cap	455	-5.3	50.5	50.6	21.4
Digital Assets 100 Small Cap	411	1.2	25.6	38.0	-18.8
MVIS IP owned by Van Eck, distributed by ...					
Bitwise Crypto Indices					
Multi-Asset Indices					
Bitwise Hold 10 Large Cap Crypto In...	444	-3.7	37.5	48.4	68.6
Bitwise IP Owned by Bitwise Asset Manage...					
BTC Cross					
Bitcoin Cash (BCH)	799	-16.7	31.2	32.5	10.1
Ethereum Classic (ETC)	511	-26.7	82.2	50.3	-15.6
Ethereum (ETH)	422	19.7	27.3	42.3	-27.7
Monero (XMR)	622	-4.5	5.0	23.2	-40.4
Litecoin (LTC)	485	-8.2	14.4	20.3	-48.7
Dash (DASH)	553	-19.5	48.4	75.3	-53.6
Zcash (ZEC)	553	-20.8	40.0	49.1	-56.2
EOS (EOS)	688	-10.5	15.7	16.5	-56.8
Ripple (XRP)	422	4.5	-0.3	12.8	-63.2

(1 pm NY, March 5)

Margin-Call Pressure Likely Temporary for Gold, Similar to 2008. Gold's margin-call headwinds should be short-lived, in our view, similar to the 2008 stock-market swoon. The accelerating decline in equities is triggering liquidation of elevated net-long futures positions in the metal. Our graphic depicts the swift correction to below the S&P 500's 50-week mean, where the drag on gold is similar to what

happened during the financial crisis over a decade ago. Gold's favorable fundamentals -- increasingly negative real yields, rising equity volatility and Federal Reserve easing -- should prevail, with limited downside below \$1,600 an ounce.

Gold Likely Caged Between \$1,600-\$1,700

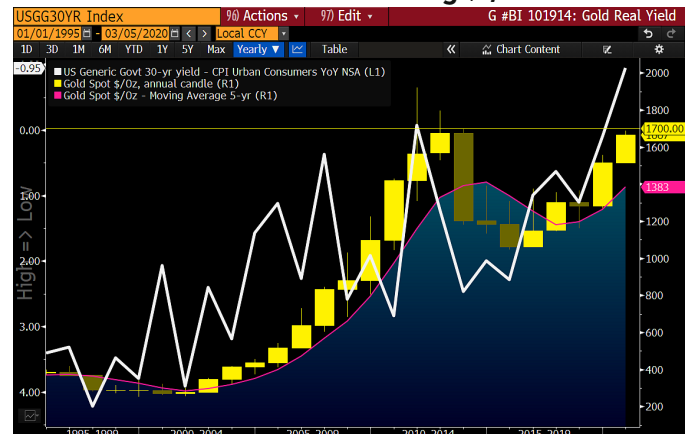


Gold is one of the few assets to sustain a 2020 profit. It's up about 10% to March 5, compared with a 5.8% gain in 2008.

Negative Real Yields and Appreciating Gold. Gold will eventually breach \$1,700 an ounce resistance, in our view, but it may take some base building to make the next step of the stair-step rally. Negative real yields -- notably in the U.S. -- represent an underlying bid in the quasi-currency. Our graphic depicts gold having fully retraced the 2013 plunge, and a primary reason to extend that year's highs -- the spread in U.S. Treasury bond yields less inflation -- has plunged to almost negative 80 bps. For comparison, the 2008 and 2011 extremes reached minus 130 bps and 110 bps, respectively.

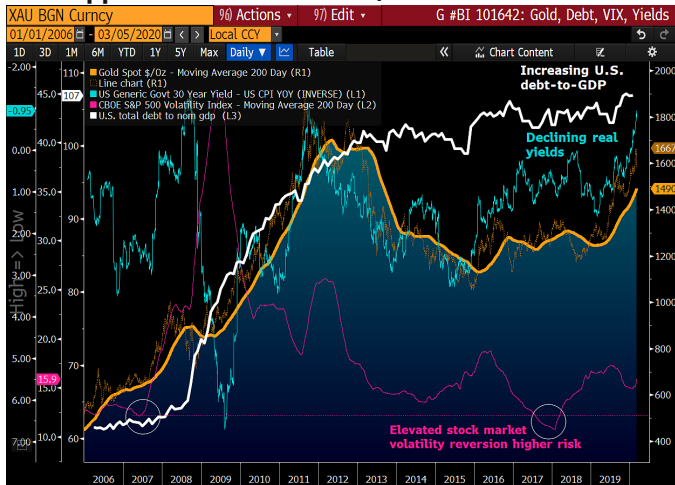
Plunging bond yields indicate deflation, and we expect the Fed to act via easing. It was the first rate cut in July that launched gold above \$1,400, which had held resistance for about five years. For gold to not appreciate, some unforeseen forces would need to flip current trends.

Gold Bull Set to Rest Before Breaching \$1,700



A Firming Foundation for Gold. The basis for a sustained structural gold bull market is solidifying, in our view. The graphic depicts the metal appearing low vs. the percentage of steadily increasing U.S. debt-to-GDP. In combination with declining real yields, this historically oxymoronic trend -- increasing debt-to-GDP and decreasing yields -- is unlikely to find an end-game that doesn't involve appreciating U.S. gold prices. Currency debasement is a primary influence on advancing gold prices, yet the dollar-denominated price is appreciating despite the trade-weighted broad dollar near all-time highs.

Gold Appears Low to Debt/GDP, Real Yields



An additional tailwind for gold prices is the limited downside from U.S. stock-market volatility near historic lows.

Increasing Bitcoin Adoption

Bitcoin Price, Maturity Supported Via Institutional Adoption.

The Bitcoin price should keep appreciating and volatility should decline, if our institutional-investor indicators are a guide. Inflows in the more buy-and-hold type vehicles, and increasing futures volume and open interest, represent firming support for the benchmark crypto's price.

ETP, Fund Investors Taking Supply Off the Market.

Inflows into Bitcoin funds and exchange-traded products (ETPs) indicate increasing allocations from buy-and-hold investors, supporting the price. Our graphic shows the percentage of assets under management in Bitcoin equivalents from such products recently at an all-time high of 2% of the total supply vs. about 1.5% a year ago. A simple interpretation is that about 360,000 Bitcoins have been taken off the tradable supply market and put into investments. The process may be in its early days, similar to the advent of gold exchange-traded funds (ETFs) in 2004.

Funds, ETPs Indicate Rising Investor Demand

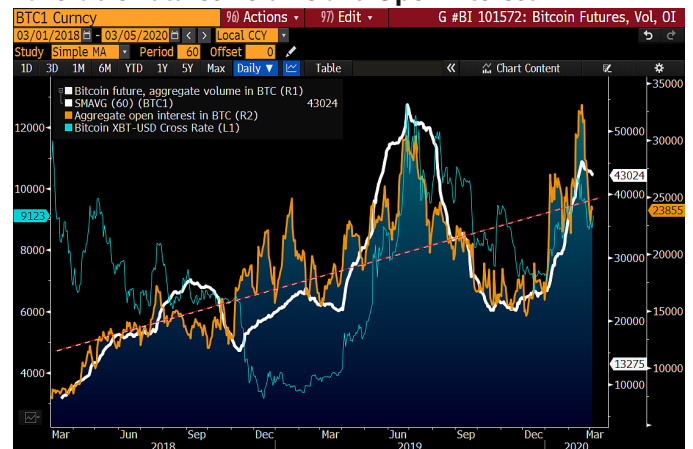


The Grayscale Bitcoin Investment Trust (GBTC) represents the majority of the Bitcoin equivalents in our database, which also includes the Bitcoin Tracker One in euros and Swedish krona. Limited to 21 million, about 90% of total Bitcoin supply has already been created.

Futures Add to Firming Bitcoin Adoption.

The up-and-to-the-right bias in listed Bitcoin futures volume and open interest is a favorable indicator for the price. Our graphic depicts Bitcoin appearing well-situated, with increasing volume and open interest on the CME-traded future. The advent of options trading this year sparked the spike in open interest to a new high and should differentiate the spurt as more enduring from a similar move in 2019 that coincided with the Bitcoin price peak.

Favorable Futures Volume and Open Interest

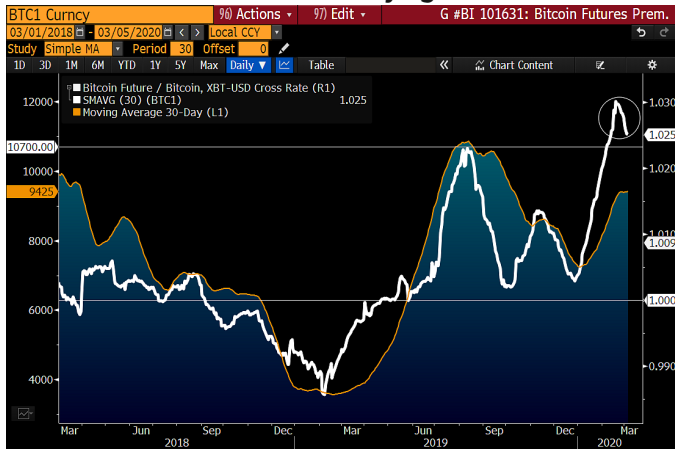


Open interest of almost 24,000 Bitcoins (about \$180 million) and 30-day volume of 43,000 (over \$330 million) indicate that a futures-based exchange-traded fund should be a matter of time. Bakkt open interest of about 1,000 Bitcoins on March 5 is off from the 1,860 high for the nascent contract traded on FNX-ICE.

Bitcoin Futures Premium Supporting Price Rise. The increasing premium in CME Bitcoin futures supports the crypto's price. The 30-day average of the CME-traded Bitcoin futures vs. the Bloomberg-disseminated price recently reached a new high. Our graphic depicts futures averaging above last year's peak at about 2% of the Bloomberg price (XBTUSD), which coincided with the peak of about \$14,000. The current futures premium implies the Bitcoin price should head toward the 2019 high.

The 30-day averages of the Bitcoin price and the futures premium/discount demonstrate similar patterns. Our graphic auto-scales these measures. End-of-day prices can vary, but we find the 30-day average sufficiently filters out the noise. CME Bitcoin futures settle the CF Bitcoin Reference Rate, which aggregates Bitcoin trading activity across major spot exchanges.

Futures Indicate More Bitcoin Buying Interest

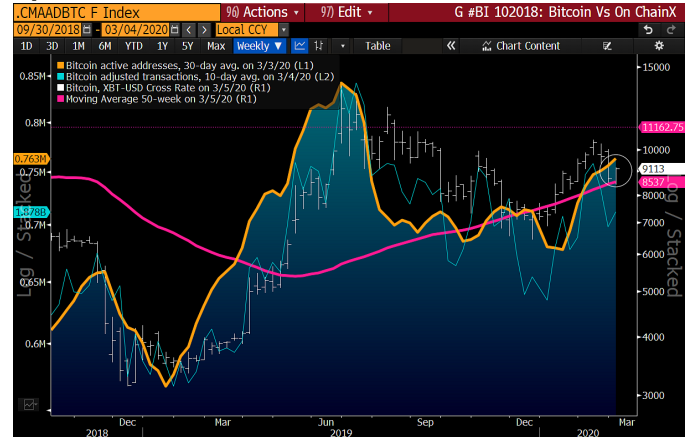


Positive On Chain Indicators

Bitcoin Primary On-Chain Indicators Hold a Price-Positive Course. Bitcoin on-chain indicators remain price supportive, particularly with supply to be sharply reduced soon, in our view. Metrics including addresses used, adjusted transactions and the hash rate show a firming foundation for the first-born crypto. Cutting the daily mining supply in half in May adds another price tailwind.

Pointing Positive: Bitcoin On-Chain Indicators. Bitcoin's upward price trajectory is intact, as evidenced by its primary on-chain indicators. Our graphic depicts favorable trends for Bitcoin's key price companions -- active addresses used and adjusted transactions from Coinmetrics. Transactions, typically the most coincident indicator, have lagged recently, but addresses reaching the highest since July indicates a firming price foundation. The Bitcoin price at about \$9,000 on March 5 appears well situated given these dynamics.

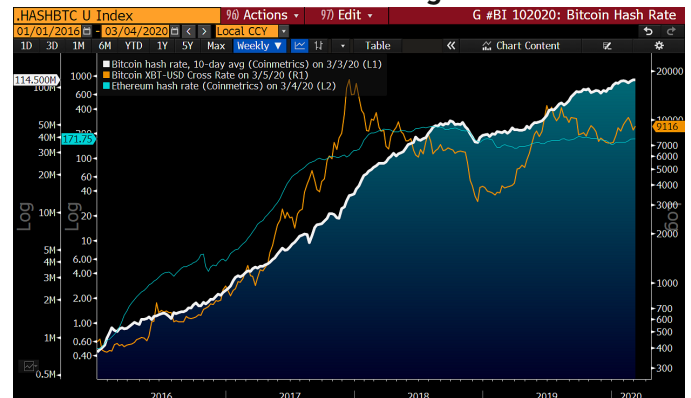
Upward Trends - Transactions, Addresses



These on-chain measures portend a rising base of price support along with Bitcoin's upward-sloping 50-week moving average of about \$8,500. We view increasing addresses as a signal of the cryptocurrency's transition toward a digital version of gold, with less focus on speculation.

Bitcoin's Upward Hash Rate, Adoption and Price. Bitcoin's advancing hash rate reflects the crypto leader's increasing adoption, dominance and price bias. Our graphic depicts the Bitcoin hash rate steadily advancing and well above that of Ethereum, the No. 2 crypto on Coinmarketcap. As measured by hash rate, the amount of processing power on the Bitcoin blockchain recently touched a record high. By contrast, the same measure of the Ethereum network is about 40% below its 2018 peak.

Bitcoin Hash Rate Reflects Increasing Dominance



This hash rate measure of the depth and processing power of a blockchain is in decline for most crypto assets, with the notable exception of Bitcoin.

{CRYPT} Page on the Bloomberg Terminal (2pm NY, March 5)

Cryptocurrency Monitor									
Index	Last	Net Chg	% Chg	Open	Yest Clo.	2D Chart	30D Rng	Time	
BGCI Bloomberg Galaxy	416.03	+18.48	4.65%	401.70	397.55			14:19	
Base USD									
Coins									
	Last	Net Chg	% Chg	Circ Supp.	Market ...	1Coin Vol.	USD Vol.	Time	
10 Bitcoin	9114.97	+382.73	4.38%	18.25M	166389.611	0.0309M	277.79M	14:19	
12 Ethereum	231.780	+8.303	3.72%	109.97M	25489.43M	0.3919M	89.71M	14:19	
13 XRP	0.2405	+0.0072	3.09%	50191.07M	12070.95M	212.9105M	50.71M	14:19	
14 Bitcoin Cash	339.68	+20.06	6.28%	18.31M	6221.04M	0.0764M	25.30M	14:19	
15 Litecoin	62.395	+2.260	3.76%	64.51M	4025.01M	0.2742M	16.91M	14:19	
16 EOS	3.8045	+0.2115	5.89%	917.38M	3490.16M	1.8499M	6.86M	14:19	
17 Monero	69.869	+4.132	6.29%	17.47M	1220.66M	0.0148M	1.02M	14:18	
18 Ethereum Classic	8.458	+0.362	4.47%	116.32M	983.83M	0.4938M	4.05M	14:19	
19 Dash	91.807	+4.450	5.09%	9.37M	860.26M	0.0073M	0.66M	14:19	
20 Zcash	53.159	+3.053	6.09%	9.26M	492.33M	0.0225M	1.17M	14:08	
Futures									
	Last	Net Chg	Volume	Open	Settle	2D Chart	30D Rng	Time	
20 CME Bitcoin	9190	+430	3379	8805	8760			14:16	

Cryptocurrency News | More »

- 40 This Utility Heats New York -- And Mines Its Own Bitcoin (1) BN 09:21
- 42 TechCrunch: South Korea passes one of the world's first comprehensive cryptocurrency laws via @... TWI 11:11
- 43 Forbes: Bitcoin Could 'Moon' If Jack Dorsey Is Ousted From Twitter FOR 02:16
- 44 Blockchain Server Firm Canaan Hit With Securities Suit Over IPO BLW 14:16
- 49 Coin Desk: Bitcoin Back Above \$9,000 Amid Bullish Sentiment WED 14:13
- 48 Daily Bitcoin: Will Bitcoin Price Hit \$12,000 in Summers this Year? WED 14:08
- 47 Cointelegraph: Chainalysis: Only 1% of \$1 Trillion Transacted in Crypto in 2019 Was Illicit NSI 14:06
- 48 Daily Bitcoin: Unstoppable Domains Chrome Extension Lets Users Browse Ethereum-Based Sites WED 14:06
- 49 Daily Bitcoin: Litecoin May Have Bottomed And Is Ready To Lead Crypto to New Highs WED 14:05

Market Access data on BI COMD

Name	2020 Q1	2019 Q4	2019 Q3	2019 Q2	2019 Q1	2018 Q4	2018 Q3	2018 Q2	2018 Q1	2017 Q4	2017 Q3	2017 Q2	2017 Q1
Assets/Market Cap (BTC)	110,149.4	94,573.3	94,695.7	105,988.7	93,255.4	90,139.7	77,425.5	87,639.1	81,159.6	84,576.9	60,047.5	38,701.1	37,075.7
ETPs (BTC)	85,964.4	78,643.3	78,030.7	76,033.7	74,860.4	74,474.7	64,715.5	74,019.1	72,654.6	80,936.9	60,047.5	38,701.1	37,075.7
Bitcoin Tracker EUR	36,401.8	34,793.2	34,969.0	33,000.4	30,166.6	28,834.3	27,463.8	26,651.6	28,048.4	28,158.0	24,911.3	15,440.0	11,271.9
Bitcoin Tracker One - SEK	26,966.7	28,430.6	28,571.7	26,530.1	25,915.0	27,404.2	24,143.7	22,729.0	25,440.7	33,890.2	35,136.2	23,261.0	25,803.8
XBT PROVIDER ETHEREUM ETN - EU	10,005.1	6,584.8	7,745.9	9,979.1	11,298.8	10,777.1	8,115.0	14,961.2	11,686.2	11,279.5			
XBT PROVIDER ETHEREUM ETN - SE	5,093.0	3,150.4	3,987.2	4,853.7	5,876.4	5,846.8	4,993.1	9,677.4	7,479.3	7,609.1			
Amun Binance Coin ETP	2,471.6	2,102.1											
Amun Crypto Basket Index ETP	1,174.9	1,019.3	1,016.1	1,009.5	970.7	1,612.4							
Amun Tezos ETP	1,166.3	349.0											
Amun Bitcoin Cash BCH ETP	945.2	766.2	720.2										
WisdomTree Bitcoin	636.1	139.0											
Amun Bitcoin Crypto Single Tra	631.4	616.8	483.7	249.5	312.1								
Amun Ripple XRP ETP	162.9	153.3	181.9	76.2									
Amun Bitcoin Suisse ETP	85.7	61.3											
Amun Ethereum Crypto Single Tr	78.8	239.7	297.5	250.4	320.9								
Amun Bitwise Select 10 Large C	75.4	90.3	57.5	84.7									
Amun Sygnum Platform Winners I	58.1	147.2											
21Shares Short Bitcoin ETP	11.4												
Inverse ETPs													
Futures Open Interest (BTC)	24,185.0	15,930.0	16,665.0	29,955.0	18,395.0	15,665.0	12,710.0	13,620.0	8,505.0	3,640.0			
CME Bitcoin Futures	24,185.0	15,930.0	16,665.0	29,955.0	18,395.0	15,665.0	12,710.0	13,620.0	8,505.0	3,640.0			
Other (BTC)													
Assets (Underlying NAV)	318,349.7	271,790.1	241,626.9	212,206.0	215,235.0	210,815.6	202,502.1	195,426.5	205,123.2	179,297.3	171,020.9	174,976.7	171,223.4
Grayscale Bitcoin Trust BTC	298,810.7	262,740.7	233,557.2	209,801.8	213,590.5	209,074.4	200,970.7	192,299.8	202,919.0	178,398.7	171,020.9	174,976.7	171,223.4
Grayscale Ethereum Trust	19,539.1	9,049.4	8,069.7	2,404.2	1,644.5	1,741.3	1,531.5	3,126.7	2,204.1	898.5			
Market Cap (Price)													
Grayscale Bitcoin Trust BTC	351,819.8												
Grayscale Ethereum Trust	96,305.1												
Bitcoin Price	8,735.6	7,158.3	8,240.9	12,212.7	4,072.2	3,674.2	6,643.4	5,899.6	6,852.5	14,310.9	4,171.3	2,502.5	1,074.7
Assets/Market Cap (\$)	969.9	679.0	783.1	1,307.2	379.9	330.6	514.5	516.8	560.4	1,211.2	250.5	96.8	39.8
ETPs (\$ Millions)	750.9	562.9	643.0	928.6	304.8	273.6	429.9	436.7	497.9	1,158.3	250.5	96.8	39.8
Bitcoin Tracker EUR	318.0	249.1	288.2	403.0	122.8	105.9	182.5	157.2	192.2	403.0	103.9	38.6	12.1
Bitcoin Tracker One - SEK	235.6	203.5	235.5	324.0	105.5	100.7	160.4	134.1	174.3	485.0	146.6	58.2	27.7
XBT PROVIDER ETHEREUM ETN - EU	87.4	47.1	63.8	121.9	46.0	39.6	53.9	88.3	80.1	161.4			
XBT PROVIDER ETHEREUM ETN - SE	44.5	22.6	32.9	59.3	23.9	21.5	33.2	57.1	51.3	108.9			
Amun Binance Coin ETP	21.6	15.0											
Amun Crypto Basket Index ETP	10.3	7.3	8.4	12.3	4.0	5.9							
Amun Tezos ETP	10.2	2.5											
Amun Bitcoin Cash BCH ETP	8.3	5.5	5.9										
WisdomTree Bitcoin	5.6	1.0											
Amun Bitcoin Crypto Single Tra	5.5	4.4	4.0	3.0	1.3								
Amun Ripple XRP ETP	1.4	1.1	1.5	0.9									
Amun Bitcoin Suisse ETP	0.7	0.4											
Amun Ethereum Crypto Single Tr	0.7	1.7	2.5	3.1	1.3								
Amun Bitwise Select 10 Large C	0.7	0.6	0.5	1.0									
Amun Sygnum Platform Winners I	0.5	1.1											
21Shares Short Bitcoin ETP	0.1												
Inverse ETPs													
Futures Open Interest (\$ Millions)	219.0	116.1	140.1	378.6	75.1	56.9	84.6	80.1	62.5	52.9			
CME Bitcoin Futures	219.0	116.1	140.1	378.6	75.1	56.9	84.6	80.1	62.5	52.9			
Other (\$ Millions)													
Assets (Underlying NAV)	2,781.0	1,945.5	1,991.2	2,591.6	876.5	774.6	1,345.3	1,152.9	1,405.6	2,565.9	713.4	437.9	184.0
Grayscale Bitcoin Trust BTC	2,610.3	1,880.8	1,924.7	2,562.2	869.8	768.2	1,335.1	1,134.5	1,390.5	2,553.1	713.4	437.9	184.0
Grayscale Ethereum Trust	170.7	64.8	66.5	29.4	6.7	6.4	10.2	18.4	15.1	12.9			
Market Cap (Price)													
Grayscale Bitcoin Trust BTC	3,073.3												
Grayscale Ethereum Trust	841.3												

The data included in these materials are for illustrative purposes only. The BLOOMBERG TERMINAL service and Bloomberg data products (the "Services") are owned and distributed by Bloomberg Finance L.P. ("BFLP") except (i) in Argentina, Australia and certain jurisdictions in the Pacific islands, Bermuda, China, India, Japan, Korea and New Zealand, where Bloomberg L.P. and its subsidiaries ("BLP") distribute these products, and (ii) in Singapore and the jurisdictions serviced by Bloomberg's Singapore office, where a subsidiary of BFLP distributes these products. BLP provides BFLP and its subsidiaries with global marketing and operational support and service. Certain features, functions, products and services are available only to sophisticated investors and only where permitted. BFLP, BLP and their affiliates do not guarantee the accuracy of prices or other information in the Services. Nothing in the Services shall constitute or be construed as an offering of financial instruments by BFLP, BLP or their affiliates, or as investment advice or recommendations by BFLP, BLP or their affiliates of an investment strategy or whether or not to "buy", "sell" or "hold" an investment. Information available via the Services should not be considered as information sufficient upon which to base an investment decision. The following are trademarks and service marks of BFLP, a Delaware limited partnership, or its subsidiaries: BLOOMBERG, BLOOMBERG ANYWHERE, BLOOMBERG MARKETS, BLOOMBERG NEWS, BLOOMBERG PROFESSIONAL, BLOOMBERG TERMINAL and BLOOMBERG.COM. Absence of any trademark or service mark from this list does not waive Bloomberg's intellectual property rights in that name, mark or logo. All rights reserved. © 2020 Bloomberg.

Bloomberg Intelligence is a service provided by Bloomberg Finance L.P. and its affiliates. Bloomberg Intelligence shall not constitute, nor be construed as, investment advice or investment recommendations (i.e., recommendations as to whether or not to "buy", "sell", "hold", or to enter or not to enter into any other transaction involving any specific interest) or a recommendation as to an investment or other strategy. No aspect of the Bloomberg Intelligence function is based on the consideration of a customer's individual circumstances. Bloomberg Intelligence should not be considered as information sufficient upon which to base an investment decision. You should determine on your own whether you agree with Bloomberg Intelligence.

Bloomberg Intelligence is offered where the necessary legal clearances have been obtained. Bloomberg Intelligence should not be construed as tax or accounting advice or as a service designed to facilitate any Bloomberg Intelligence subscriber's compliance with its tax, accounting, or other legal obligations. Employees involved in Bloomberg Intelligence may hold positions in the securities analyzed or discussed on Bloomberg Intelligence.