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The Investment Case for Bitcoin



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Bitcoin as a Potential Store of Value



- Understanding the differences between monetary and intrinsic value
- Bitcoin's combination of durability, scarcity, privacy, and its nature as a bearer asset all contribute to it holding monetary value
- Bitcoin is on the path to becoming digital gold
- So why don't institutional investors own bitcoin?

Please see important disclosures at the end of this presentation.

Bitcoin and Monetary Theory



To determine if Bitcoin has value, it is important to start with understanding the two types of value

- **Intrinsic Value (IV):** Value that exists because an economic good produces cash flow or has overt utility: equities, fixed income, real estate, and consumable commodities (corn, oil, etc).
- **Monetary Value (MV):** Value that exists *in spite* of an economic good *not* having intrinsic value or value that exists in excess of an economic good's intrinsic value

Goods with Intrinsic Value

Equities

Fixed Income

Real estate

Corn

Wheat

Oil

Copper

Goods with Monetary Value

Gold

Silver

Diamonds

Bitcoin

Artwork

U.S. Dollars

Emeralds, rubies, other gemstones

* Precious metals have a tiny amount of intrinsic value because of industrial uses. Nonetheless, the prices of precious metals largely reflect their monetary value. If gold were to trade at a price that reflected only its industrial use it would be far cheaper than it is today. Please see important disclosures at the end of this presentation.

Monetary Value



- **Nothing ever “backs” MV:** MV is inherently a bet that an object will retain value or increase in value in the future. Items with MV are items that store value and can be seen as claims on future IV. This may make people uncomfortable but it has been true since the dawn of civilization.
- **MV arises because of collective belief:** Behavioral economics, herd behavior, etc. Humans have long needed a way to store value outside of IV. Money is a natural consequence of a productive society
- Monetary value needn't relate to any sovereign power: historically, most objects of monetary value have no relationship to a sovereign power – gold, gemstones, etc.
- The creation of a new object with monetary value is rare, but not unheard of. Artwork is a good example. Artwork as MV is a phenomenon of the past few centuries. Artwork did not have MV in early societies.
- MV usually arises from special needs or circumstances:
 - Gold acquired MV because it was scarce, durable and relatively easy to make into coins, bars, etc.
 - Bitcoin has MV because it is scarce (which is spectacularly unique in a digital world), durable, has strong privacy characteristics (i.e. it is pseudonymous), is a bearer asset that can be memorized (making it especially useful in authoritarian regimes)

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Monetary Theory



- **The generation of MV does not require that an object be attached to a payment system**
 - Artwork is not used for payments but its value is entirely MV
 - Gold was used in the past for payments but nowadays only on a very limited basis
 - Bitcoin is **not** a terrific payment system but certainly better than artwork and gold
- The more people that come to accept than an object has MV, the more likely it is to have MV in the future
- Volatility is an inherent consequence of the process of an object acquiring MV
 - When gold first acquired MV there was plenty of disagreement about how many goats you could get for an ounce of gold
- *Currency* is a sub-type of money. *Money* is a sub-type of items with MV
 - USD is a currency: usable for transactions on a regular basis
 - Gold coins are a money: usable on a *very* limited basis for transactions but not as easily as a currency
 - Artwork is an object with MV. Not readily usable for transactions but plenty of MV nonetheless
 - Bitcoin is not quite a currency but most certainly is a money, however it may become a currency in the future

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Bitcoin Has the Potential to Become “Digital Gold”

Bitcoin vs. Gold vs. Dollar

Traits of Money	Gold	Government Issued (U.S. dollar)	Crypto (Bitcoin)
Fungible (Interchangeable)	High	High	High
Non-consumable	High	High	High
Portability	Moderate	High	High
Durable	High	Moderate	High
Highly divisible	Moderate	Moderate	High
Secure (cannot be counterfeited)	Moderate	Moderate	High
Easily transactable	Low	High	High
Scarce (predictable supply)	Moderate	Low	High
Sovereign (Government issues)	Low	High	Low
Decentralized	Low	Low	High
Smart (Programmable)	Low	Low	High

Source: MVIS Website, As of 06/30/2019. Please see important disclosures at the end of this presentation.

Why don't Institutional Investors Have Exposure to Bitcoin?

None of the traditional capital markets infrastructure participants handle bitcoin

- The difficulty largely has to do with bitcoin's nature as a bearer asset
- The plumbing to connect bitcoin with capital markets has been limited

Capital Markets

Function / entity	Stocks, bonds, etc.	Bitcoin and other digital assets
Custodians	✓	✗
Prime brokers	✓	✗
Clearing entities	✓	✗
Settlement entities	✓	✗
Transfer agents	✓	✗

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Bitcoin's Role in an Investment Portfolio

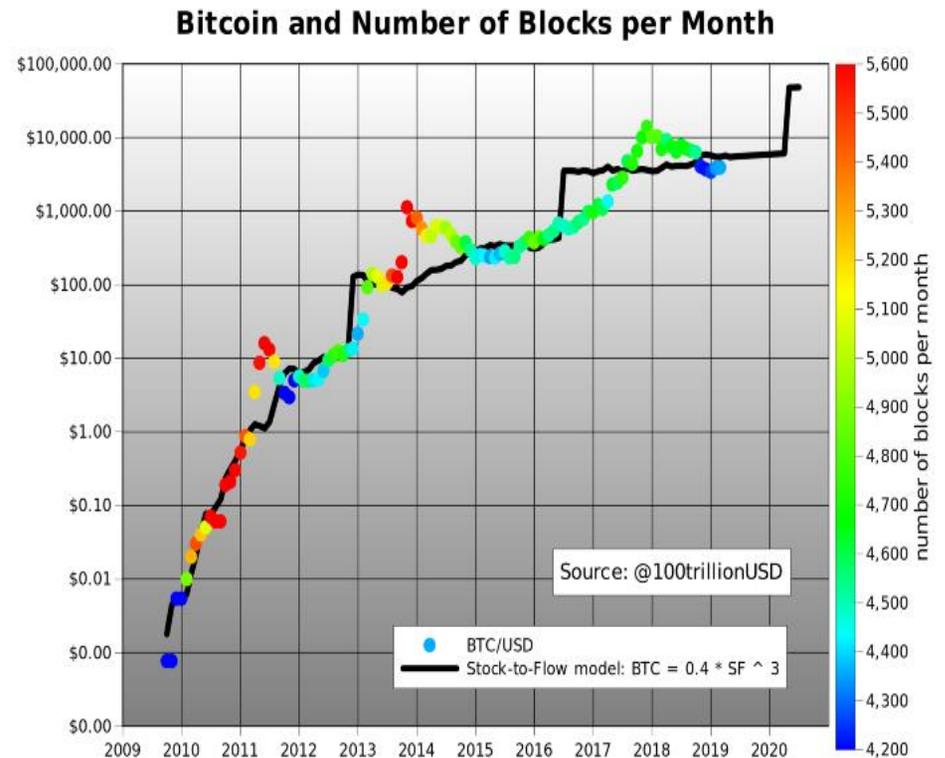
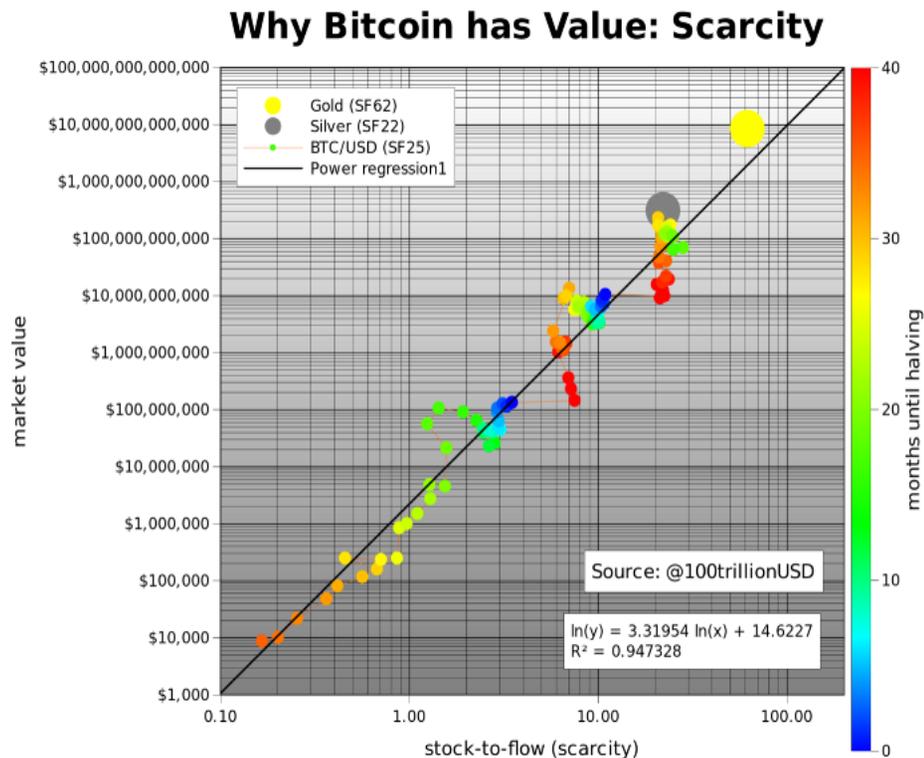


- If Bitcoin is increasingly used as an asset with monetary value both on-chain and off-chain, then how might one think of it as an investment?
- Several theories exist that point to increasing scarcity and Network Transfer Value as some of the drivers for historical Bitcoin growth
- Bitcoin historical performance and how that could fit into an investment portfolio

Please see important disclosures at the end of this presentation.

Stock to Flow Ratio Illustrates Bitcoin Growth Potential

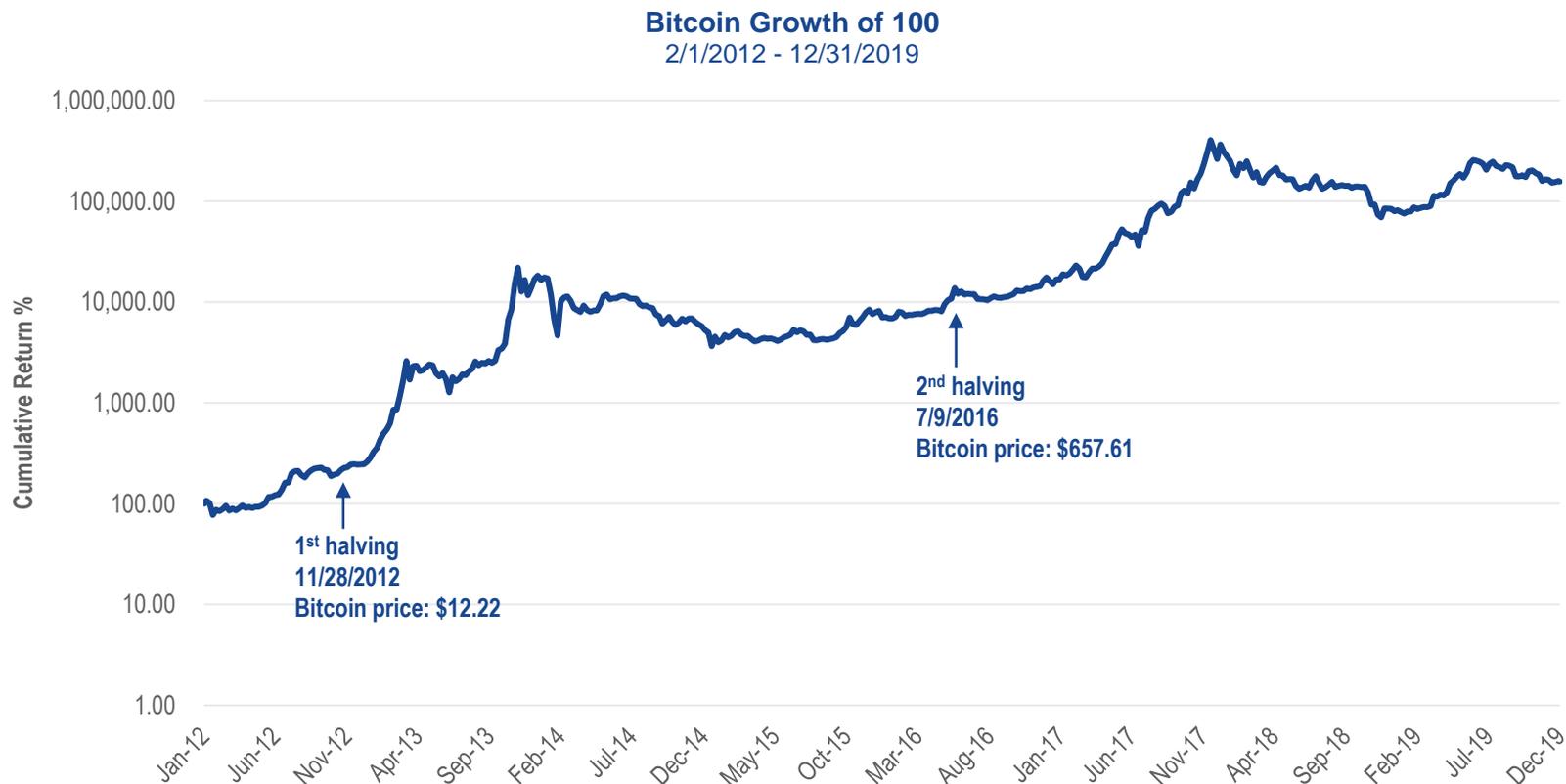
- The stock to flow ratio is defined as the amount of an asset that is held in reserves divided by the amount of that asset produced for a selected time period
- The below stock to flow data suggest that bitcoin may have potential to grow based on historical data and scarcity characteristics of bitcoin, gold and silver



Source: Medium, "Modeling Bitcoin's Value with Scarcity," March 22, 2019. Please see important disclosures at the end of this presentation.

Bitcoin Halving Illustrates Scarcity-Driven Historical Growth

- Halving is defined as a 50% block reward cut to bitcoin production rate. Halvings are programmed into bitcoin and occur roughly every four years (210,000 blocks)
- Historically, given the increasing scarcity induced by halvings, the price of bitcoin has increased following halvings over the course of Bitcoin's lifecycle
- The next halving is expected in May 2020



Source: Cryptocompare. Data as of 12/31/2019. Please see important disclosures at the end of this presentation.

Bitcoin Historically Outperforms Traditional Asset Classes

- Bitcoin has performed well versus major indices
- Most long term periods such as 3 and 5 year have been historically positive for Bitcoin

Bitcoin Growth of 100
2/1/2012 - 12/31/2019



	1 Month	3 Months	YTD	1 Year	3 Years	5 Years
Bitcoin	-5.13	-13.06	86.38	86.38	107.18	93.20
S&P 500	3.02	9.07	31.49	31.49	15.27	11.70
US Bonds	-0.07	0.18	8.72	8.72	4.03	3.05
Gold	3.42	3.41	18.87	18.87	9.76	5.16
ACWI	3.39	8.56	24.05	24.05	10.25	6.27

Source: Cryptocompare. Data as of December 31, 2019. US Bonds is measured by the Bloomberg Barclays US Aggregate Index; Gold is measured by the S&P GSCI Gold Spot Index; US Real Estate is measured by the MSCI US REIT Index; Oil is measured by the Brent Crude oil spot price, Emerging Market Currencies is measured by the Bloomberg Barclays EM Local Currency Government Index. See disclaimers and index descriptions at the end of this presentation. Past performance is no guarantee of future results.

Low Correlation with Traditional Asset Classes



- Very low correlation with traditional asset classes such as broad market equity indices, bonds and gold
- Potential for increased portfolio diversification

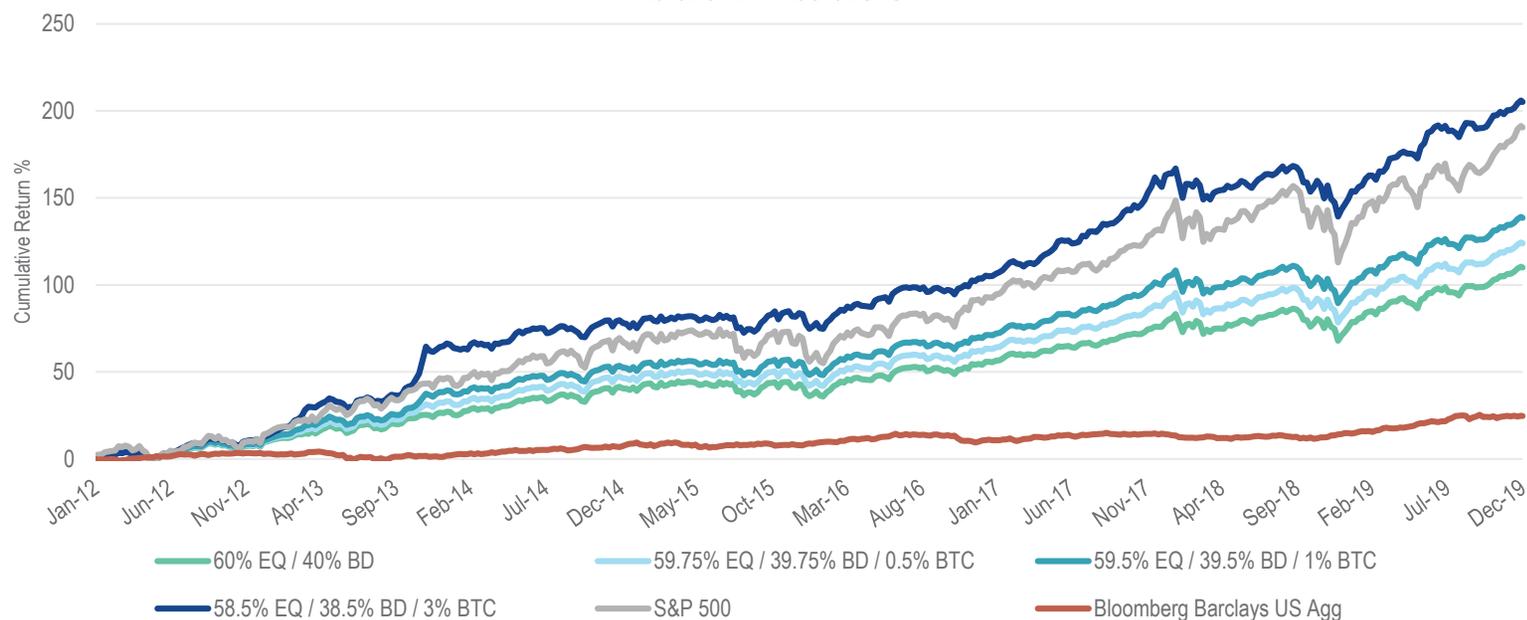
Correlation 2/1/2012 to 12/31/2019	S&P 500	US Bonds	Bitcoin	Gold	US Real Estate	Oil	Emerging Market Currencies
S&P 500	-	-0.30	0.01	-0.05	0.59	0.31	0.29
US Bonds	-0.30	-	0.03	0.28	0.12	-0.18	0.09
Bitcoin	0.01	0.03	-	0.03	0.04	-0.05	-0.01
Gold	-0.05	0.28	0.03	-	0.07	0.08	0.30
US Real Estate	0.59	0.12	0.04	0.07	-	0.12	0.27
Oil	0.31	-0.18	-0.05	0.08	0.12	-	0.23
Emerging Market Currencies	0.29	0.09	-0.01	0.30	0.27	0.23	-

Source: Morningstar. Data as of December 31, 2019. US Bonds is measured by the Bloomberg Barclays US Aggregate Index; Gold is measured by the S&P GSCI Gold Spot Index; US Real Estate is measured by the MSCI US REIT Index; Oil is measured by the Brent Crude oil spot price, Emerging Market Currencies is measured by the Bloomberg Barclays EM Local Currency Government Index. See disclaimers and index descriptions at the end of this presentation.

A Small Bitcoin Allocation May Improve Portfolio Upside

- Bitcoin may enhance the risk and return reward profile of institutional investment portfolios
- A small allocation to bitcoin significantly enhanced the cumulative return of a 60% equity and 40% bonds portfolio allocation mix while only minimally impacting its volatility

Asymmetric Return Profile
2/1/2012 - 12/31/2019

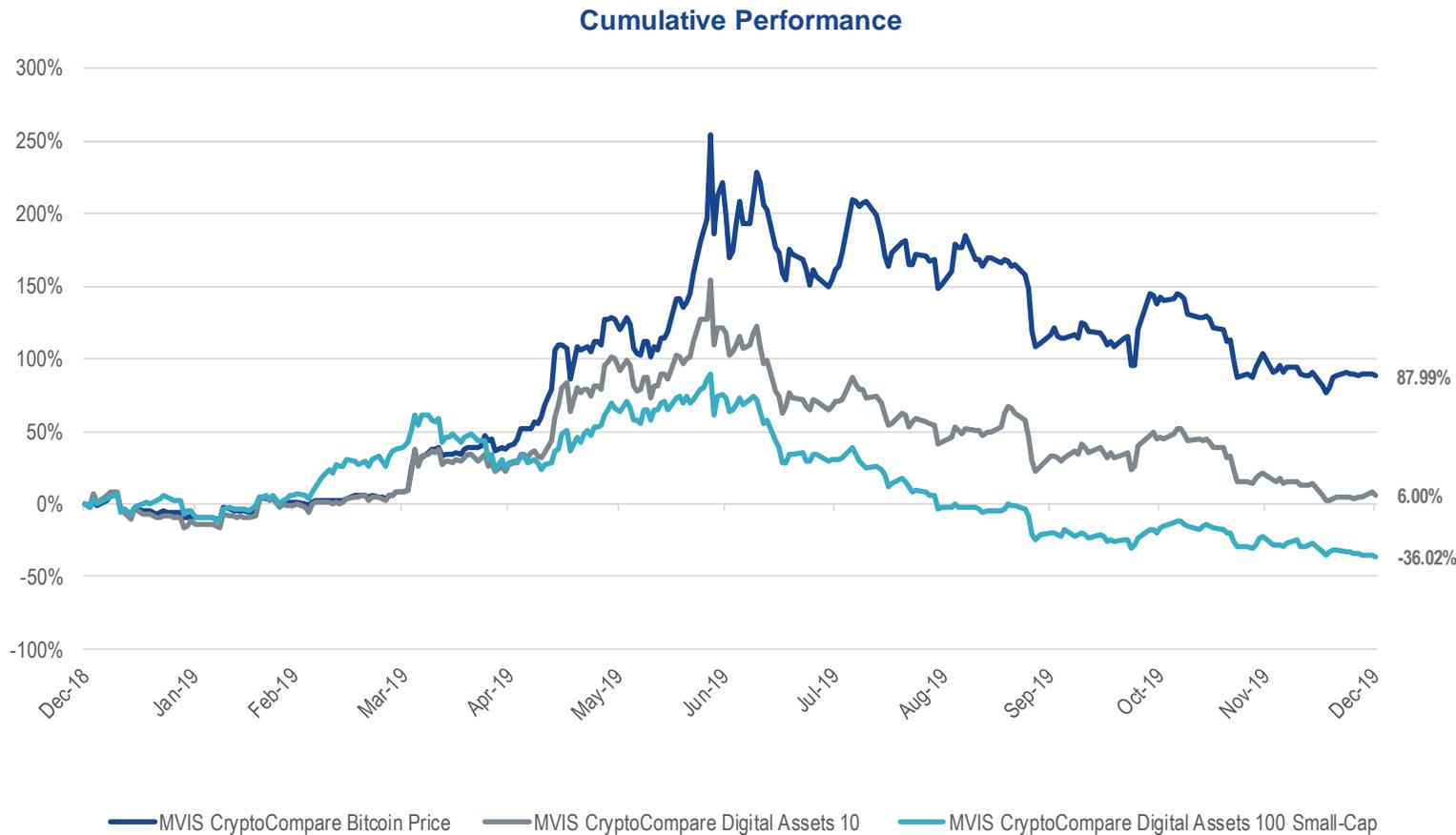


	Cumulative Return	Annualized Return	Std Dev	Beta
S&P 500	190.53	14.42	10.98	1.00
Bloomberg Barclays US Agg	24.63	2.82	2.91	-0.04
60% EQ / 40% BD	109.98	9.82	6.53	0.59
59.75% EQ / 39.75% BD / 0.5% BTC	123.88	10.72	6.70	0.59
59.5% EQ / 39.5% BD / 1% BTC	138.51	11.61	6.99	0.60
58.5% EQ / 38.5% BD / 3% BTC	205.18	15.13	9.16	0.64

Source: Morningstar. Data as of 12/31/2019. Please see important disclosures at the end of this presentation.

Bitcoin and Large-Caps Decouple From Small-Caps

- As the digital asset industry has matured, Bitcoin decouples from small caps and drives large-cap index performance
- Bitcoin to small cap performance difference has been 124% and the large cap to small cap performance difference has been approximately 42% in the past year as illustrated by the below indices



Source: Bloomberg/MVIS, Data as of 12/31/2019. Please see important disclosures at the end of this presentation.

Bitcoin Market Structure Risks



Bitcoin risks to consider include:

- Hacking of trading platforms and participants in the life cycle of a trade (usually social engineering)
- Price volatility
- Encryption vulnerability; developments in quantum computing (which would increase success of private key hacking; credit cards more vulnerable nevertheless)
- Novelty/extreme early stage of many applications
- Unintentional coding error
- Governance shortcomings
- Can miners and developers “run” the “core” software? (Linux is a good example for successful execution)
- Ecosystem design
- Will payments continue to sustain processing and verification activities

Heavy Momentum in Crypto Developments

- State Regulation
 - Colorado exempts crypto from state securities regulation
 - Wyoming recognized crypto as property, allows banks to be custodians, enables tokenization
- Physically Settled Bitcoin Futures receive regulatory approval
- Established custodians enter crypto
- Established brokerages to offer spot digital asset trading.
- Pension funds and endowments allocate to digital assets.
- Global regulators start cracking down on ICOs/unregistered offerings. Bitcoin is different.
- ETFs under consideration. VanEck-SolidX proposal is at the top of the pile.



Please see important disclosures at the end of this presentation.

Accelerating Bitcoin Adoption



Crypto Exchanges are Healthy: Not Going Away



- Bitfinex makes over \$400 million¹: Top 650 of U.S. companies; Binance in the same range
- Liquidity...Bitcoin daily volume over \$1.75 billion²
- Bitcoin and crypto became more available to retail investors
 - Swiss Exchange offers crypto trading (no Europe equity exchanges)
 - Robinhood, TD and Etrade offer trading in crypto
 - Etoro, large crypto broker, offers commission-free trading in ETFs
 - Exchange-standard surveillance software implemented by crypto exchanges
 - OTC crypto brokers offer price feed to market through MVIS
- CME futures contracts top 15,000 BTC open interest, \$125 million notional³
- Crypto exchanges use best practices, such as surveillance and accounting software
- Exchanges are the target of hackers but can reimburse losses (Binance refunds \$40 million in losses from insurance fund)⁴

¹ Bitfinex. Data as of 5/8/2019

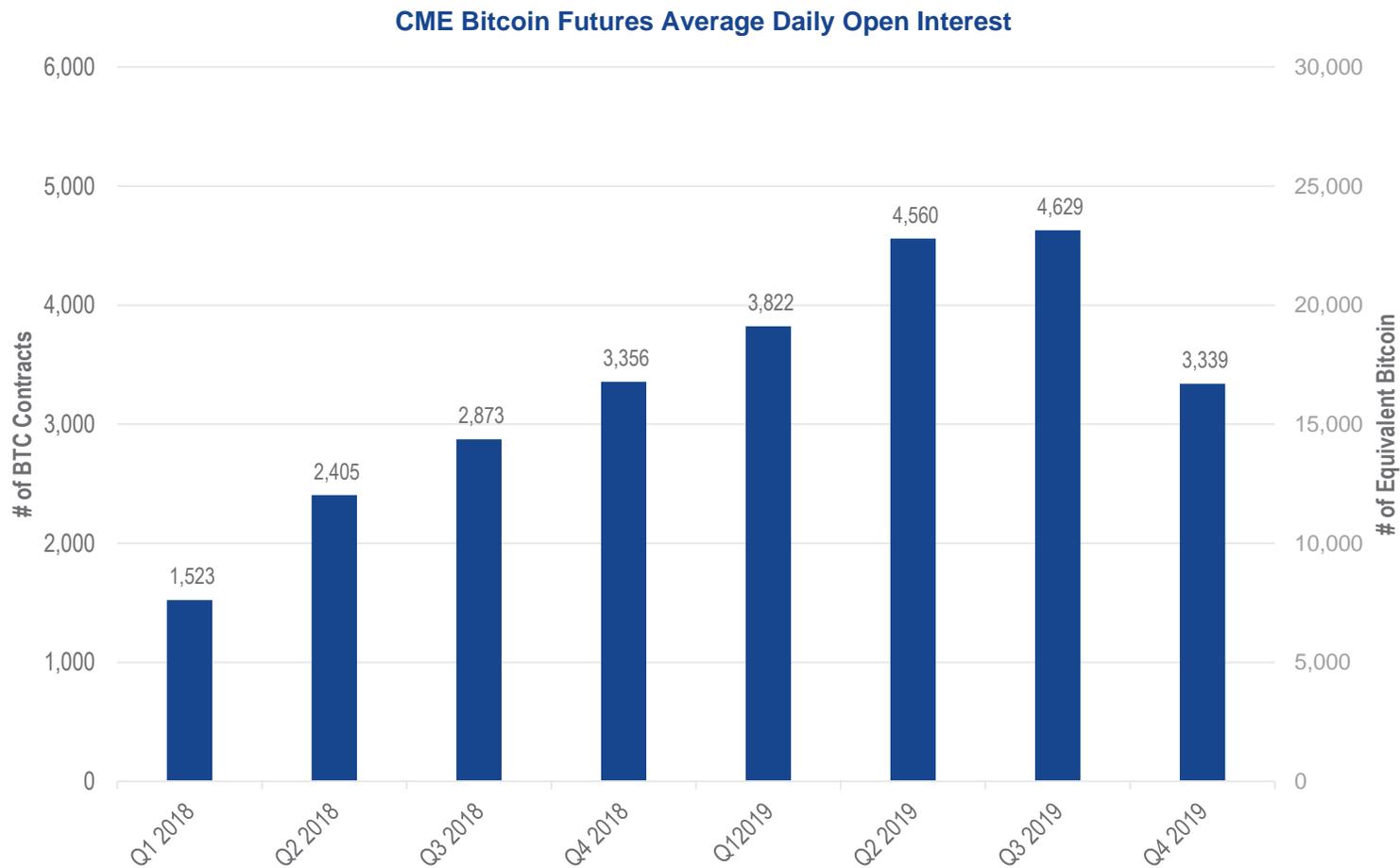
² Cryptocompare. Data as of 12/31/2019

³ CME. Data as of 12/31/2019.

⁴ Binance.

Please see important disclosures at the end of this presentation.

CME Bitcoin Futures Contract Sets New Trading Record



Source: CME Group. Data as of 12/31/2019. Please see important disclosures at the end of this presentation.

Bitcoin Trading is Not Concentrated

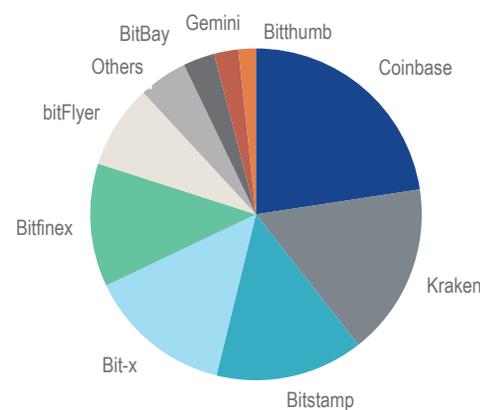
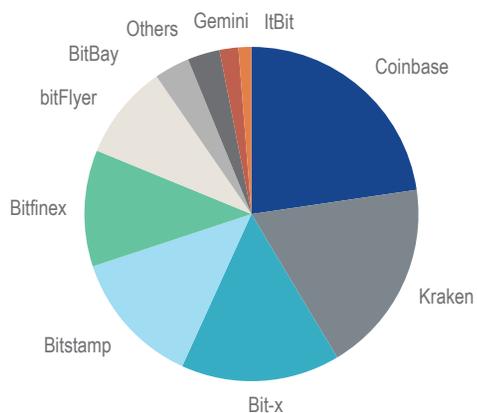


1 Month

Exchange	Volume (BTC)	Market Share
Coinbase	356K	22.68%
Kraken	294K	18.73%
Bit-x	242K	15.39%
Bitstamp	206K	13.13%
Bitfinex	176K	11.26%
bitFlyer	145K	9.20%
BitBay	54K	3.42%
Others	49K	3.12%
Gemini	29K	1.82%
ItBit	20K	1.25%

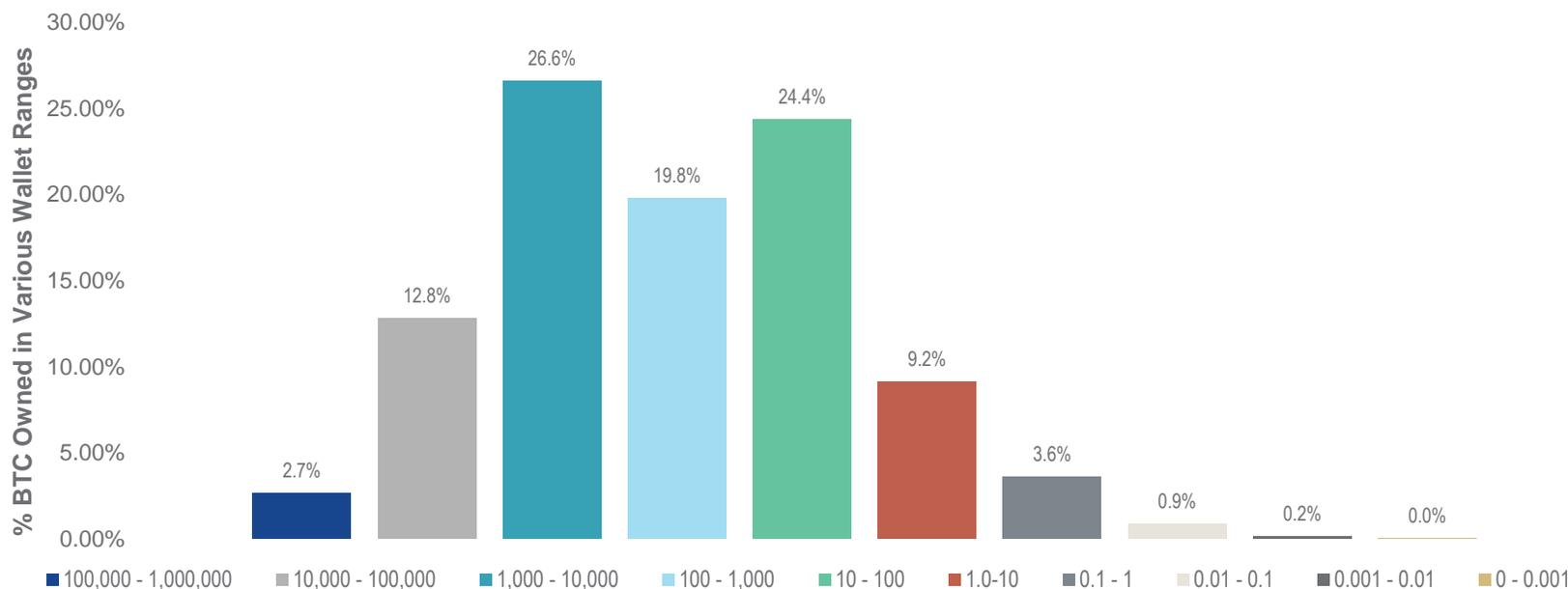
6 Months

Exchange	Volume (BTC)	Market Share
Coinbase	2.34M	22.59%
Kraken	1.74M	16.82%
Bitstamp	1.50M	14.42%
Bit-x	1.46M	14.11%
Bitfinex	1.24M	12.00%
bitFlyer	847K	8.17%
Others	491K	4.74%
BitBay	319K	3.07%
Gemini	247K	2.38%
Bitthumb	175K	1.69%



Source: Bitcoinity. Data as of January 2020.

Bitcoin Ownership Seems Well Distributed/Not Concentrated



Caveat

- Multiple wallets per person
- Digital asset exchange wallets represent bitcoin holdings of multiple persons

Amount BTC Owned	Number of Wallets	Amount USD Owned	Total % Owned	Cumulative % Owned
100,000 - 1,000,000	3	4,185,605,774	2.7%	2.7%
10,000 - 100,000	115	20,068,437,951	12.8%	15.5%
1,000 - 10,000	1,857	41,731,020,614	26.6%	42.1%
100 - 1,000	14,199	31,050,200,987	19.8%	61.8%
10 - 100	134,694	38,229,763,739	24.4%	86.2%
1.0 - 10	585,866	14,354,741,994	9.2%	95.4%
0.1 - 1	1,971,924	5,638,254,515	3.6%	99.0%
0.01 - 0.1	4,667,132	1,384,455,616	0.9%	99.8%
0.001 - 0.01	5,968,069	243,526,278	0.2%	100.0%
0 - 0.001	12,806,108	25,466,531	0.0%	100.0%

Source: Bitcoin Blockchain; as of January 2020.

Bitcoin Adoption Continues: Nodes and Users



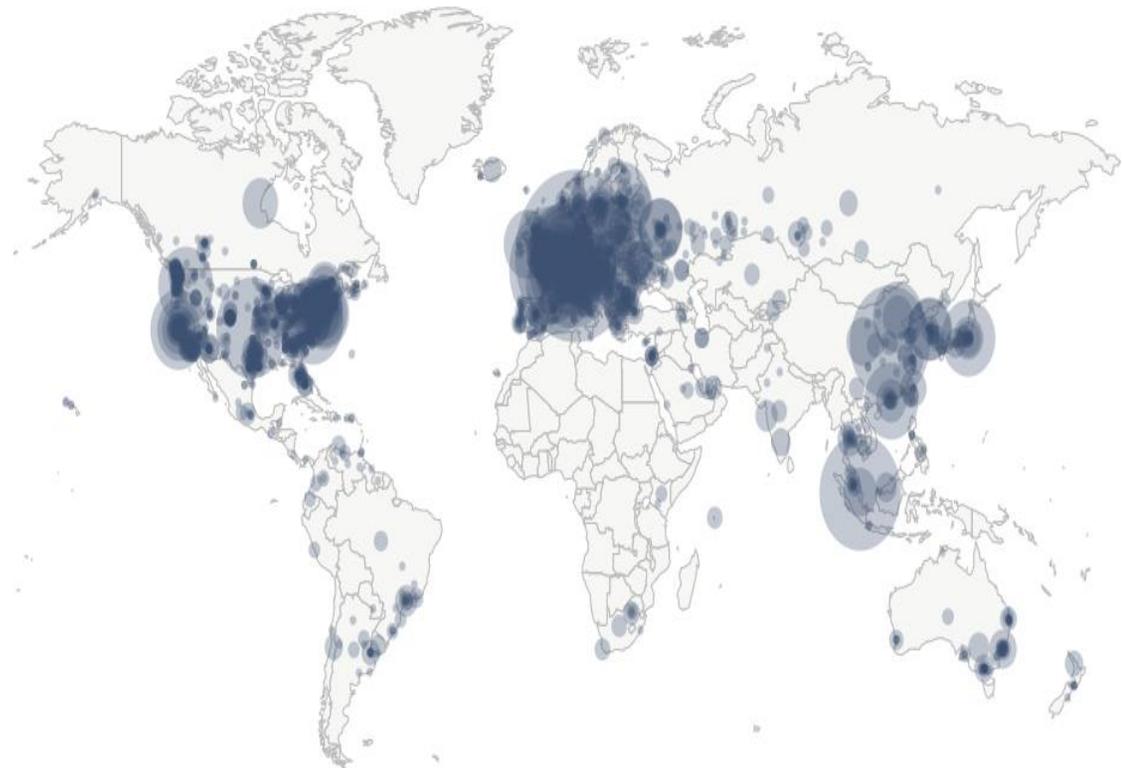
- A full-node is a computer that downloaded and continuously updates a full copy of the Bitcoin-blockchain (You can host your own full node with as little as 200GBs! It's your own mini bank!)
- A mining node is a computer that participates in the verification of transactions on the Bitcoin-blockchain

10435 Nodes

10,000 Bitcoin Mining Nodes and 100,000 Full Nodes

Top 10 countries with their respective number of reachable nodes are as follows

Rank	Country	Nodes
1	United States	2378 (21.84%)
2	Germany	1887 (17.33%)
3	n/a	1779 (16.34%)
4	France	602 (5.53%)
5	Netherlands	484 (4.44%)
6	Singapore	337 (3.09%)
7	United Kingdom	329 (3.02%)
8	Canada	323 (2.97%)
9	China	251 (2.30%)
10	Russian Federation	244 (2.24%)

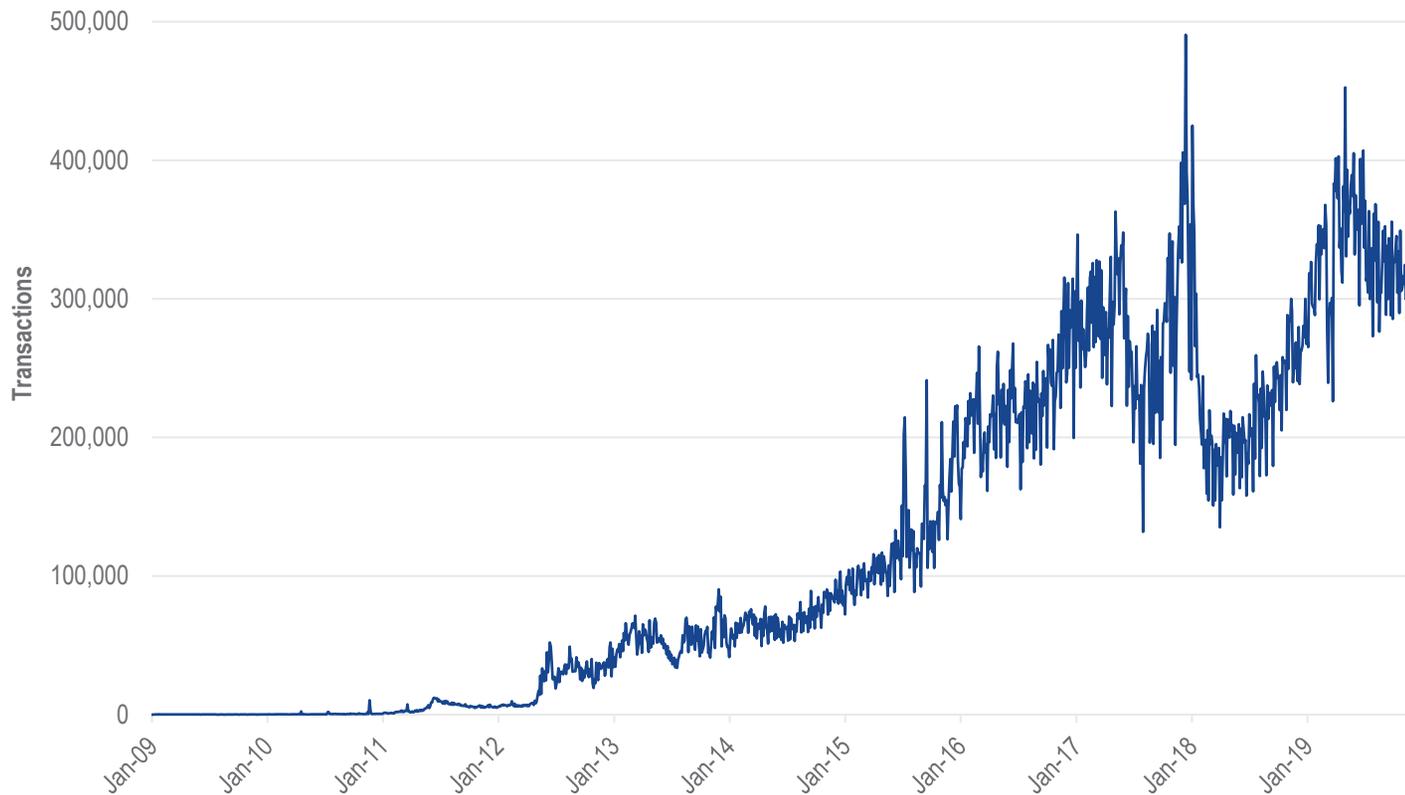


Source: Bitnodes.earn.com. Data as of January, 2020. Please see important disclosures at the end of this presentation. n/a represents unknown locations, but likely are mining pools.

Bitcoin Adoption Continues: On-Chain Transactions

- Bitcoin transactions cross 400,000 permissionless transactions a day exhibiting significant network value
- Bitcoin on-chain transactions amount to 15% of SWIFT transactions¹

Daily Confirmed Bitcoin Transactions



¹SWIFT is a global member-owned cooperative and the world's leading provider of secure financial messaging services.

Source: Blockchain.info. Data as of 12/31/2019. Please see important disclosures at the end of this presentation.

Tracking Bitcoin Adoption Off-Chain



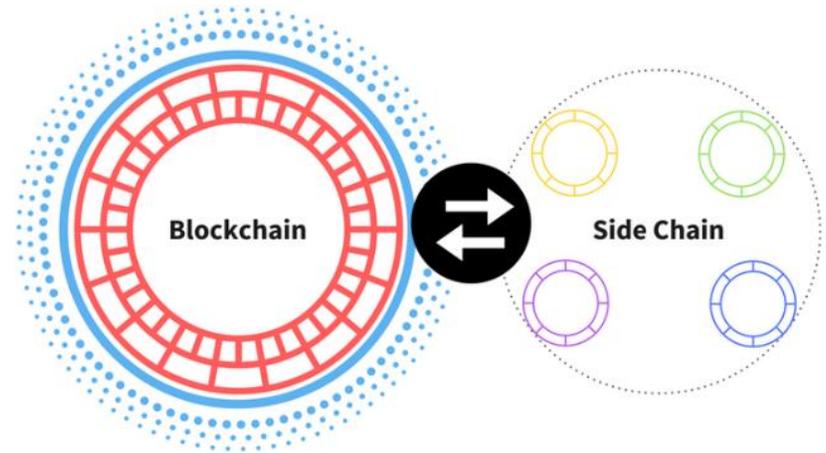
- A number of applications are being built on Bitcoin and there is a natural evolution taking place
- Sidechains could be the next step in boosting Bitcoin adoption as they allow for scalability and customizations while retaining Bitcoin's security properties
- Built on top of the Bitcoin-blockchain, the Lightning Network pushes the boundaries of Bitcoin payment capabilities with lower costs and faster speeds
- Taking advantage of Bitcoin's trust-minimized features, Microsoft works to build a decentralized identity platform on the Bitcoin-blockchain

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Sidechains Supercharge Bitcoin Capabilities



- **Established code base** – Sidechains are based on Bitcoin-blockchain architecture
- **Security** – Sidechains preserve the most important security properties of the Bitcoin-blockchain
- **Scalability** – Sidechain transactions make verification faster (Example: The Liquid sidechain supports Lightning enabling scalability up to millions of transactions per second)
- **Privacy** – Confidential transactions increase privacy for network participants
- **Customization** – Possible to apply investor restrictions on sidechains, Bitcoin is permissionless



Lightning Network is a Significant Payments Layer on Bitcoin

- **The Lightning Network** – Is a payment-focused layer 2 application built on top of the Bitcoin-blockchain (almost like a sidechain but different)
- **Scalability** – Millions of transactions per second vs Bitcoin (7 tx/sec) and Visa (45,000 tx/sec)¹
- **Cost** – Bitcoin transactions to reduce to fraction of a cent, instead of dollars
- **Privacy** – Retained from Bitcoin network; identity only posted when lightning channel closed
- **Importance** – Decentralized and trust-minimized transactions to compete with established centralized payment networks such as Visa, MasterCard, PayPal, etc...



¹Visa. Data as of 08/2017

Please see important disclosures at the end of this presentation.

Microsoft Secures Online Identity Using Bitcoin

- **What?** Decentralized online identity platform; secure trust-minimized login
- **Who?** Microsoft decides to build it on Bitcoin
- **Where?** Built on top of the Bitcoin-blockchain (layer 2)
- **Why?** Online identity is centralized, fragmented and prone to theft
- **When?** Launched on testnet in May 2019¹



¹Microsoft

Please see important disclosures at the end of this presentation.

Ten Most Liquid Digital Assets



Rank	Coin	Price	Direct Vol. 24 Hour	Total Vol. 24 Hour	Market Cap
1	 Bitcoin BTC	\$8,946.85	\$268.28 M	\$2.58 B	\$162.70 B
2	 XRP XRP	\$0.2330	\$21.57 M	\$286.40 M	\$23.30 B
3	 Ethereum ETH	\$171.10	\$41.41 M	\$1.15 B	\$18.73 B
4	 Bitcoin Cash BCH	\$372.69	\$52.99 M	\$992.26 M	\$6.80 B
5	 Bitcoin SV BSV	\$312.01	\$133.20 M	\$1.11 B	\$5.69 B
6	 Tether USDT	\$0.9993	\$6.38 M	\$33.61 B	\$4.64 B
7	 EOS EOS	\$4.021	\$10.61 M	\$1.26 B	\$4.10 B
8	 Litecoin LTC	\$59.38	\$13.41 M	\$304.41 M	\$3.78 B
9	 Binance Coin BNB	\$17.83	-	\$49.83 M	\$2.77 B
10	 Chainlink LINK	\$2.65	\$2.87 M	\$23.79 M	\$2.65 B

Source: CryptoCompare. Data as of 1/27/2020. Please see important disclosures at the end of this presentation.

Index Definitions



All indices are unmanaged and include the reinvestment of all dividends but do not reflect the payment of transactions costs, advisory fees or expenses that are typically associated with managed accounts or investment funds. Indices were selected for illustrative purposes only and are not securities in which investments can be made. The returns of actual accounts investing in natural resource equities, energy equities, diversified mining equities, gold equities, commodities, oil, industrial metals, gold, U.S. equities and U.S. bonds strategies are likely to differ from the performance of each corresponding index. In addition, the returns of accounts will vary from the performance of the indices for a variety of reasons, including timing and individual account objectives and restrictions. Accordingly, there can be no assurance that the benefits and risk/return profile of the indices shown would be similar to those of actual accounts managed. Performance is shown for the stated time period only.

The **S&P® 500 Index**: a float-adjusted, market-cap-weighted index of 500 leading U.S. companies from across all market sectors. **The Bloomberg Barclays U.S. Aggregate Bond TR Index**: is a broad-based benchmark that measures the investment grade, U.S. dollar-denominated, fixed-rate taxable bond market. The index includes Treasuries, government-related and corporate securities, MBS (agency fixed-rate and hybrid ARM pass-throughs), ABS and CMBS (agency and non-agency). **The Bloomberg Barclays EM Local Currency Government TR Index**: is a flagship index that measures the performance of local currency Emerging Markets (EM) debt. Classification as an EM is rules-based and reviewed annually using World Bank income group, International Monetary Fund (IMF) country classification and additional considerations such as market size and investability. **The MSCI US REIT Index**: is a free float-adjusted market capitalization index that is comprised of equity REITs and represents about 99% of the US REIT universe and securities are classified in the Equity REITs Industry (under the Real Estate sector) according to the Global Industry Classification Standard (GICS®). It however excludes Mortgage REIT and selected Specialized REITs. **The S&P GSCI Gold Index**: Is a sub-index of the S&P GSCI, provides investors with reliable and publicly available benchmark tracking the COMEX gold future. The index is designed to be tradable, readily accessible to market participants, and cost efficient to implement. **The MVIS CryptoCompare Bitcoin Index** measures the performance of a digital assets portfolio which invests in Bitcoin. **The MVIS CryptoCompare Digital Assets 10 Index** is a modified market cap-weighted index which tracks the performance of the 10 largest and most liquid digital assets. Most demanding size and liquidity screenings are applied to potential index components to ensure investability. **The MVIS CryptoCompare Digital Assets 100 Small-Cap Index** is a market cap-weighted index which tracks the performance of the 50 smallest digital assets in the MVIS CryptoCompare Digital Assets 100 Index.

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