



Cryptocurrency Overview

This presentation is furnished on a confidential basis to the recipient for informational purposes only. The opinions expressed herein are those of Marquette Associates, Inc. and are subject to change without notice. This material is not financial advice or an offer to purchase or sell any product. Past performance is not indicative of future results. For full disclosure information, please refer to the end of this presentation.

Introductions

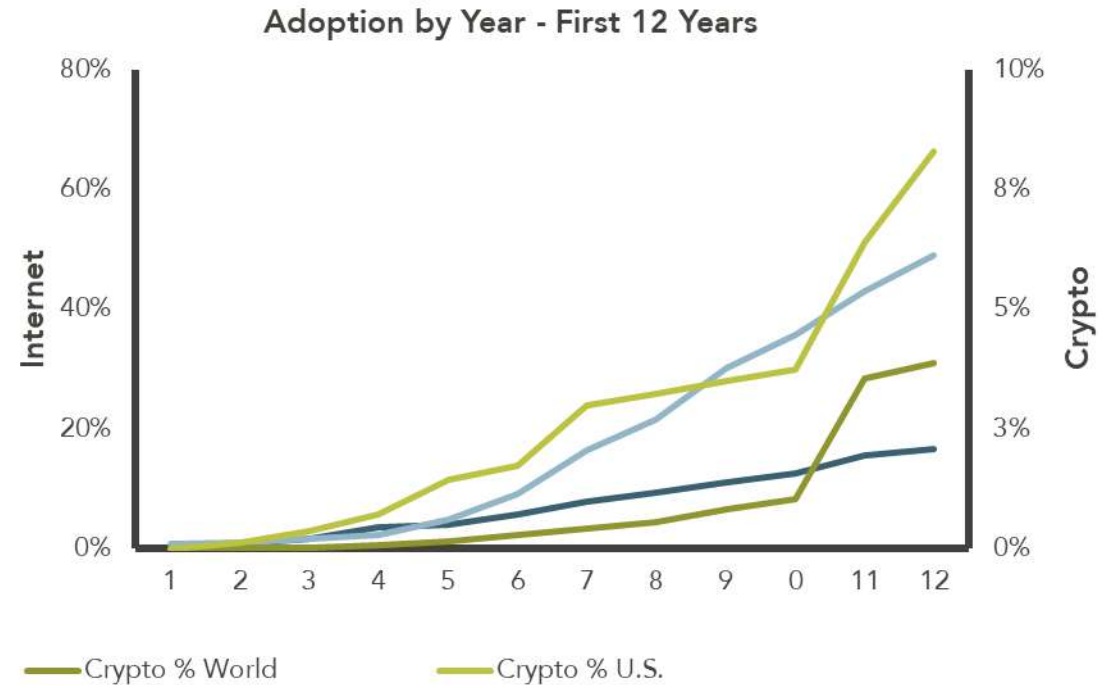
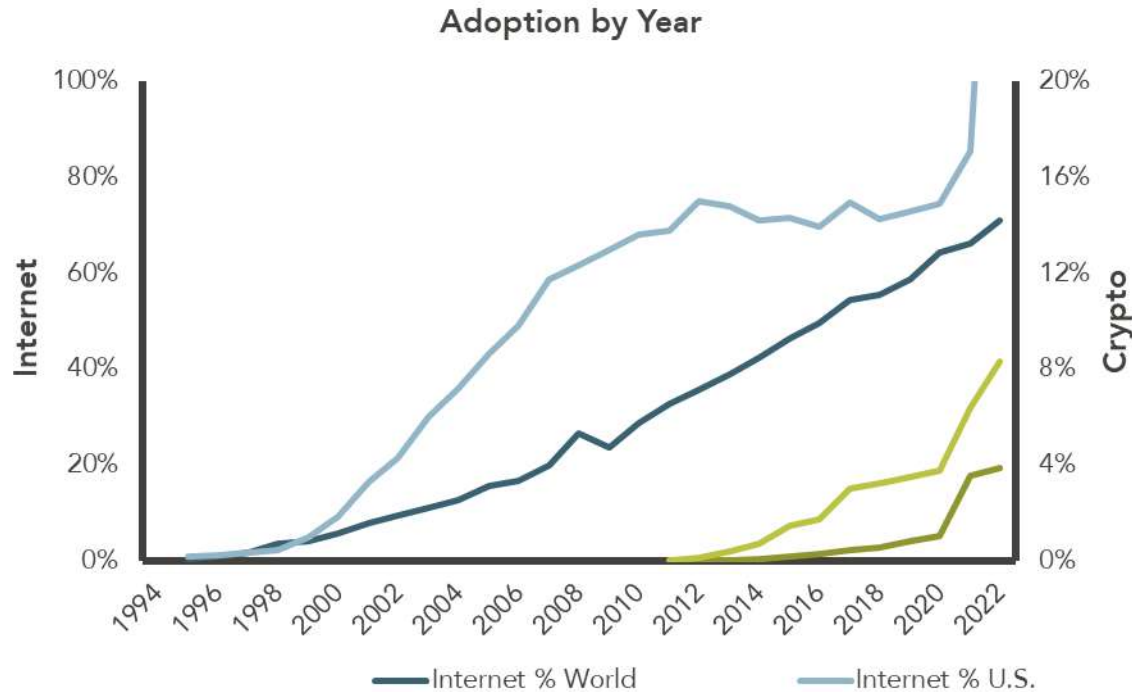


Nic Solecki
Research Associate

Thought starter: The internet & crypto

Crypto adoption is often compared to the internet because it has evolved from the internet.

In terms of total users and % of world population, there appears to be some commonality between crypto adoption to date and internet adoption prior to 2000.

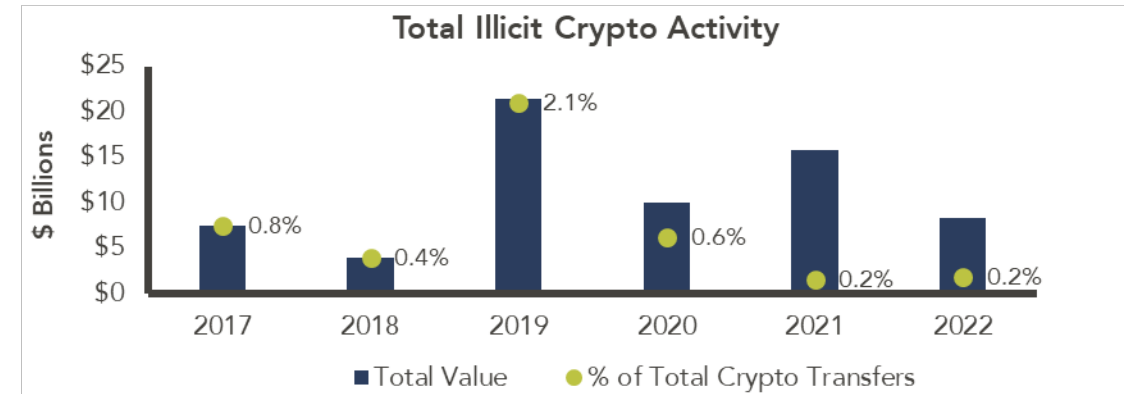
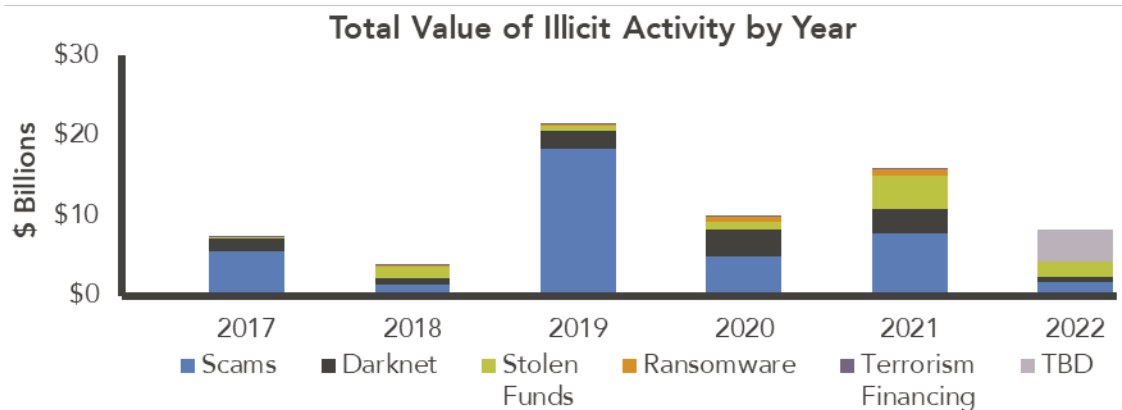
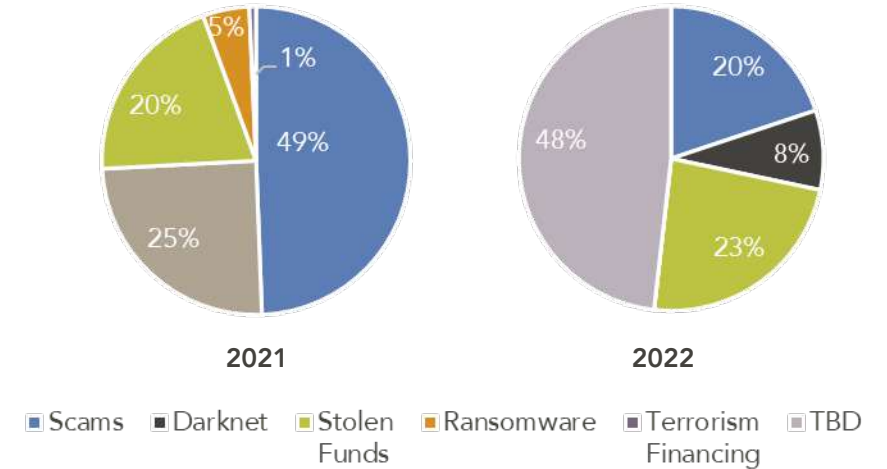


Sources: Internet World Stats; The World Bank - World Development Indicators; TripleA - Cryptocurrency across the world; Coinbase; Blockchain.com & Binance reports.

Thought starter: Crypto crime & illicit activity

- Analysis conducted by Chainalysis, in partnership with government agencies and financial institutions in over 60 countries, suggests the prevalence of crypto-crime and market commentary regarding it may be overstated.
- Illicit activity accounts for \$8.3 billion, ~0.2%, of the ~\$5 trillion transacted in 1H22.
 - ↳ In context: The U.N. Office on Drugs & Crime estimates that ~1.9% (\$2 trillion) of global GDP is laundered in aggregate per year.
 - ↳ The total value of illicit crypto activity in 2022 is estimated at 0.008% of global GDP.

Crypto-Crime Composition



Sources: Chainalysis 2021 Crypto Crime Report; Chainalysis 2022 Crypto Crime Report; Chainalysis 2022 Mid-year Crypto Crime Update

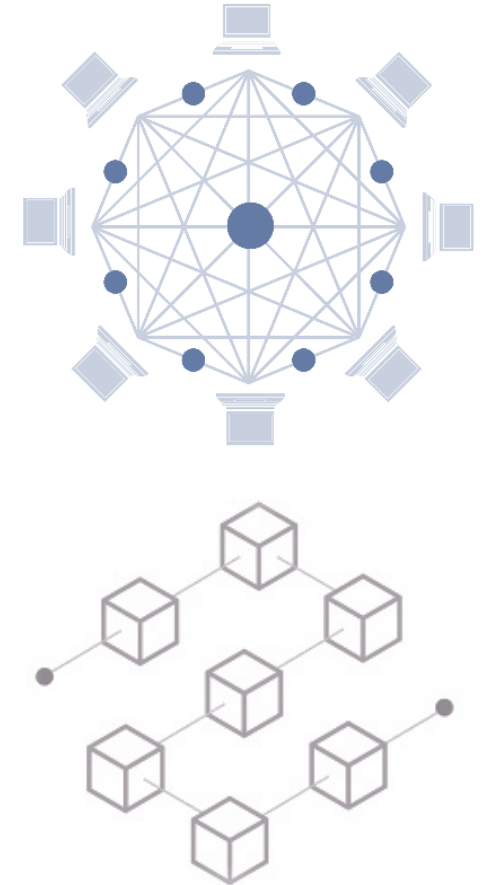
Terminology

- **Bitcoin:** The first successful and largest blockchain-based cryptocurrency. Bitcoin was introduced in a 2008 whitepaper by the anonymous Satoshi Nakamoto as a response to the financial crisis. The first physical market transaction using Bitcoin was completed on May 22, 2010; two Papa John's pizzas were purchased with 10,000 BTC valued at \$41. Today, 10,000 BTC is valued around \$400 million.
- **Blockchain:** Distributed ledger technology, the underlying technology of cryptocurrencies. A decentralized network of computers that share a distributed ledger that maintains an unbroken chain of transactions. Blockchain was first introduced in 1991. Bitcoin's introduction in 2008 presented the first application of blockchain technology.
- **Cryptocurrency:** A digital currency secured by cryptography. Transactions are verified and records are maintained by a decentralized system based on blockchain technology. There is no physical product, only balances kept on a public ledger.
- **DeFi:** Decentralized finance is a blockchain-based P2P form of traditional financial services, utilizing autonomous smart contracts to expand the quality and reach of financial services. DeFi is inherently global and enables low-cost services for anyone with an internet connection.
- **Digital Assets:** Intangible blockchain-based assets which serve as mediums of exchange, units of account, or stores of value.
- **FinTech:** Financial technology. Any software/algorithm/technology designed to improve or automate financial services — depositing a check with a smartphone, online investment management and trading platforms, blockchain currencies.
- **Non-fungible tokens (NFT):** A digital asset in which each token is unique (as opposed to "fungible" assets like Bitcoin or paper currency where all units are interchangeable). An NFT uses a smart contract platform to authenticate ownership of unique assets. NFTs are a subgroup of tokenized assets, commonly associated with art, music, videos, and rare items such as baseball cards.

What are blockchains?

Blockchains are digitally distributed ledgers of account, shared and reconciled by a network of computers. Also referred to as **distributed ledger** technology.

- Introduced in 1982 in a doctoral dissertation by David Chaum as a programmed system in which computer networks could reliably maintain undisputable records between untrusting parties, without the need for a trusted third party.
- Blockchains do not store data in a central location. Instead, data blocks are copied and distributed across a network of computers.
 - Data blocks are contiguously linked on a ledger, forming a chain.
 - When a new data block is to be added, every computer on the network updates its ledger to reflect the change.
- Cryptography was introduced in 1991 by Stuart Haber and W. Scott Stornetta to both timestamp transactions and secure the network.
 - Accounts are commonly referred to as “wallets” due to the decentralized and individualized nature of crypto.
 - To transact, public account identifiers (public keys) are available and logged on the public ledger.
 - To ensure security and ownership, private identifiers (private keys) are only available to account owners.

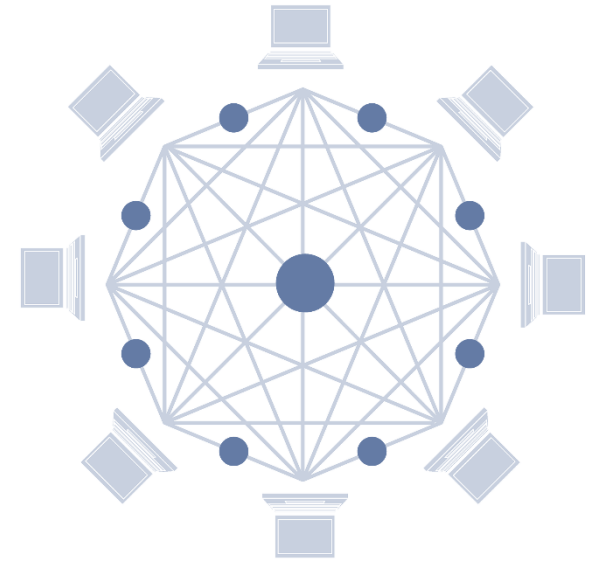


Sources: Computer Systems Established, Maintained, and Trusted by Mutually Suspicious Groups (1982); How to time-stamp a digital document – Journal of Cryptology (Jan. 1991); Bitcoin and cryptocurrency technologies: a comprehensive introduction, Princeton University Press.

How do blockchains work?

Transfers (transactions) on a blockchain network are executed by authorized computer systems called **nodes**.

- **Validator nodes** maintain full copies of distributed ledgers. They validate if a transaction may occur, confirm if the transaction was successful, and record it on the ledger.
 - Some blockchains, such as Bitcoin, require **mining nodes** to both confirm transactions before they are added to the ledger and to create new coins. Mining is a characteristic of Proof-of-Work consensus protocol commonly associated with Bitcoin.
 - Several alternate consensus protocols which optimize energy use and network costs have been developed and deployed. The various forms and technical nature of consensus protocols is beyond the scope of this introduction.
- **Validating a transaction requires approval and consensus from a defined majority of the network's nodes.**
 - Blockchains are considered decentralized if no single entity controls 51% or more of the network's validator nodes.
 - If a transaction breaks the network's consensus rules, the transaction fails and is not recorded. It is not possible to "bounce a check" on distributed ledgers.
- Once recorded, the chain is immutable and unalterable.
 - Hacking a blockchain is nearly impossible.
 - Altering one data block requires simultaneously hacking a majority of validator nodes and altering their ledgers.

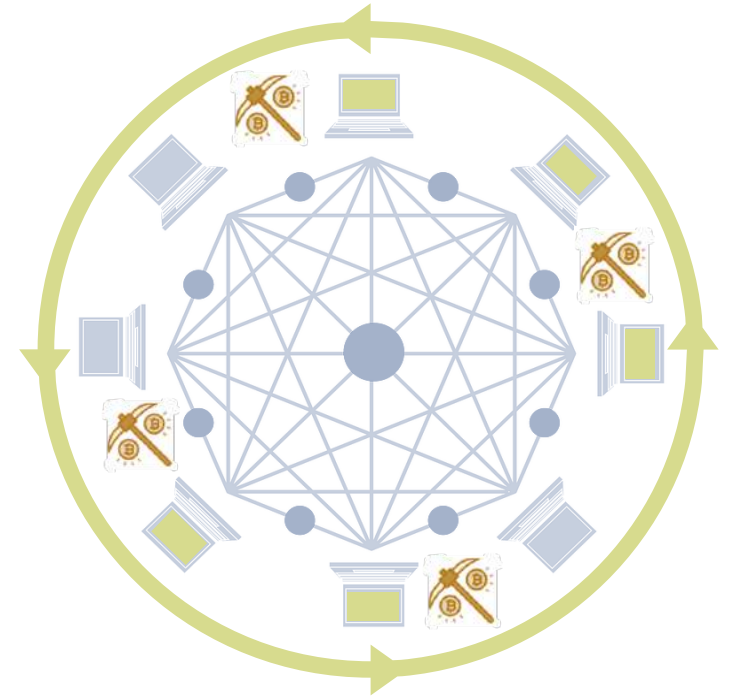


Source: [Bitcoin Nodes vs. Miners: Demystified](#)

Why do blockchains use cryptocurrency?

Blockchains require a native unit of account and an incentive for individuals or groups to operate as validators.

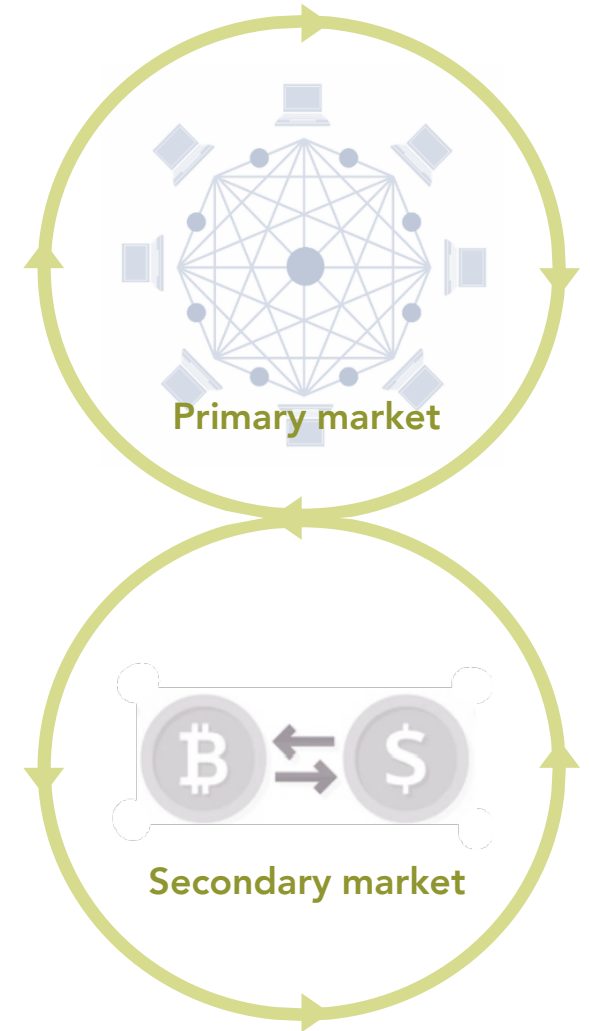
- Cryptocurrencies serve as units of account and operational incentives on blockchains.
 - Validators receive a fee for validated transfers
 - Miners receive rewards for mining blocks – typically a fraction of new blocks mined
- Their extrinsic value (instrument value) is dependent on several variables:
 - Use case
 - Cost to create & use
 - Network adoption
 - Network development
 - Supply & demand
- Multiple cryptos exist because competition and development lead to new networks optimizing for use case and cost.
- A blockchain network and its constituents can be thought of as a primary market.



Why do crypto exchanges exist?

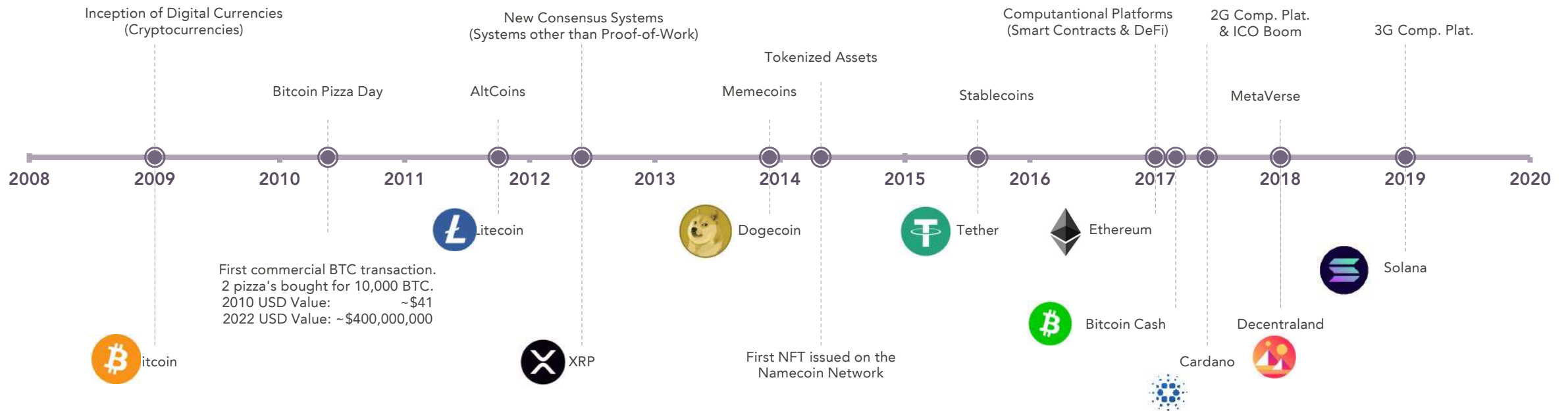
Digital exchanges are secondary markets for cryptocurrencies and other digital assets. They were initially developed for liquidity and designed to simplify asset purchases, transfers, and custody by non-issuing parties.

- As digital exchanges grew, new opportunities emerged in the market.
 - Speculation and short-term trading similar to equity, bond, commodity, and forex markets.
 - Early-stage tech investments with growth and risk profiles akin to venture capital or seed investments.
 - Lucrative high-risk-high-reward opportunities traditionally only accessible to accredited investors
 - There is no equity stake in a network or enterprise
 - Returns are realized through capital appreciation similar to investments in real assets
- Cryptocurrencies now provide liquidity for their network, capital for primary market development, and investment opportunities for secondary market participants.



Simplified crypto timeline

- Bitcoin launched in January 2009 as the first blockchain peer-to-peer payment network.
- Bitcoin was created in response to the 2008 Financial Crisis, serving as an independent and objective financial network for parties who no longer trusted traditional financial institutions or systems.
- New blockchain networks began to emerge after 2011.
- Some mimicked the Bitcoin network with modest changes (Litecoin); Others used entirely new systems (XRP); and some were made simply to mock Bitcoin speculation (Dogecoin).
- More than 800 ICOs occurred globally between 2017 and 2019, drawing both investor and regulator attention.
- New networks continue to launch, driven by competition, use-case developments, and programmatic blockchain innovations.



How cryptocurrency evolved into digital assets

- The heat map below demonstrates how overwhelming the crypto space can appear to unversed observers.
 - Bitcoin is one of ~8,000 coins, many of which are nothing like Bitcoin by design or function.
 - “Cryptocurrency” as a name is, to a large extent, a misnomer.
 - More than two-thirds of cryptos are not currencies by design, function, or market application.
- To make crypto easier to understand and more appealing, industry professionals relabeled cryptocurrencies broadly as digital assets and informally as crypto.
- Digital assets are intangible, blockchain-based assets that are generally used as:
 - Mediums of exchange
 - Units of account
 - Stores of value
- Similar to fiat currencies, commodities, and derivatives, digital assets lack the intrinsic value commonly associated with cash flow generating businesses.

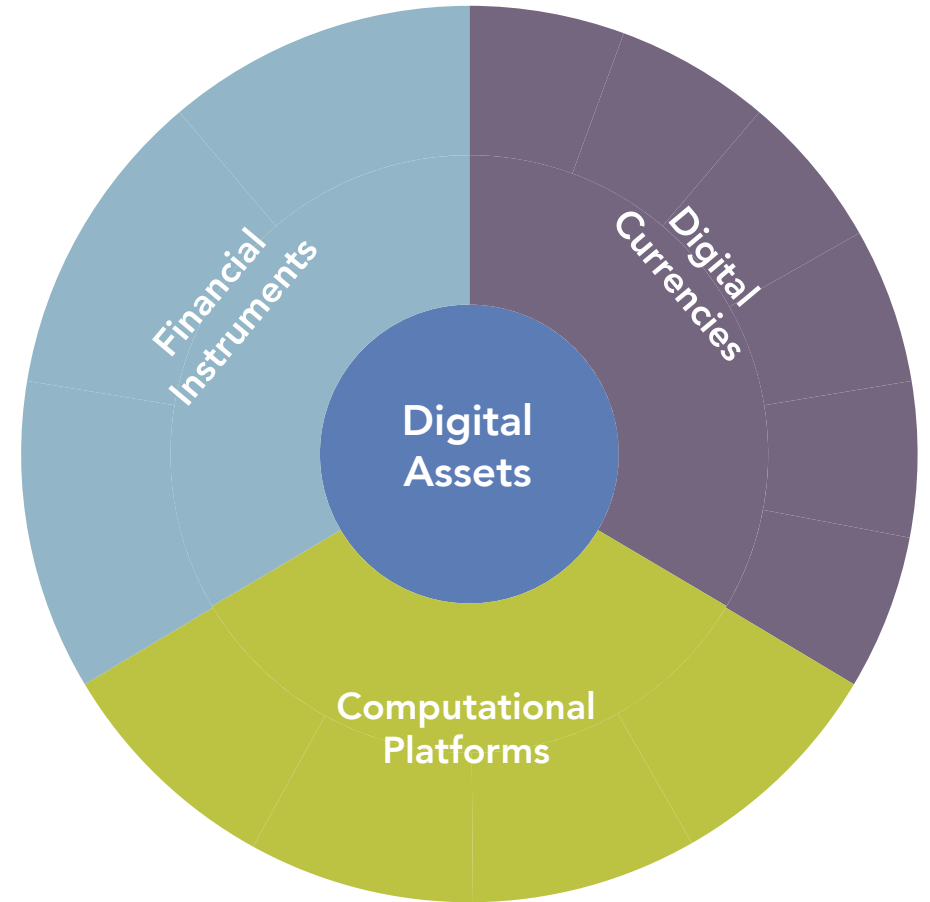


Sources: FTSE Russell & DAR, 2021; MVIS & VanEck; Messari

Digital asset super sectors

Digital assets offer **extrinsic value** (instrument value) similar to communication networks, internet applications, software, and intellectual property.

- **Extrinsic value** is dependent:
 - Use case / utility
 - Adoption & sustained use
 - Network development
 - Supply & Demand
- Based on their use case, digital assets can be codified within three super sectors:
 - Digital currencies
 - Computational platforms
 - Financial instruments



Sources: FTSE Russell & DAR, 2021; Messari; MVIS & VanEck

Digital asset subsectors

Digital assets can have multiple use cases as many applications are mutually supportive.

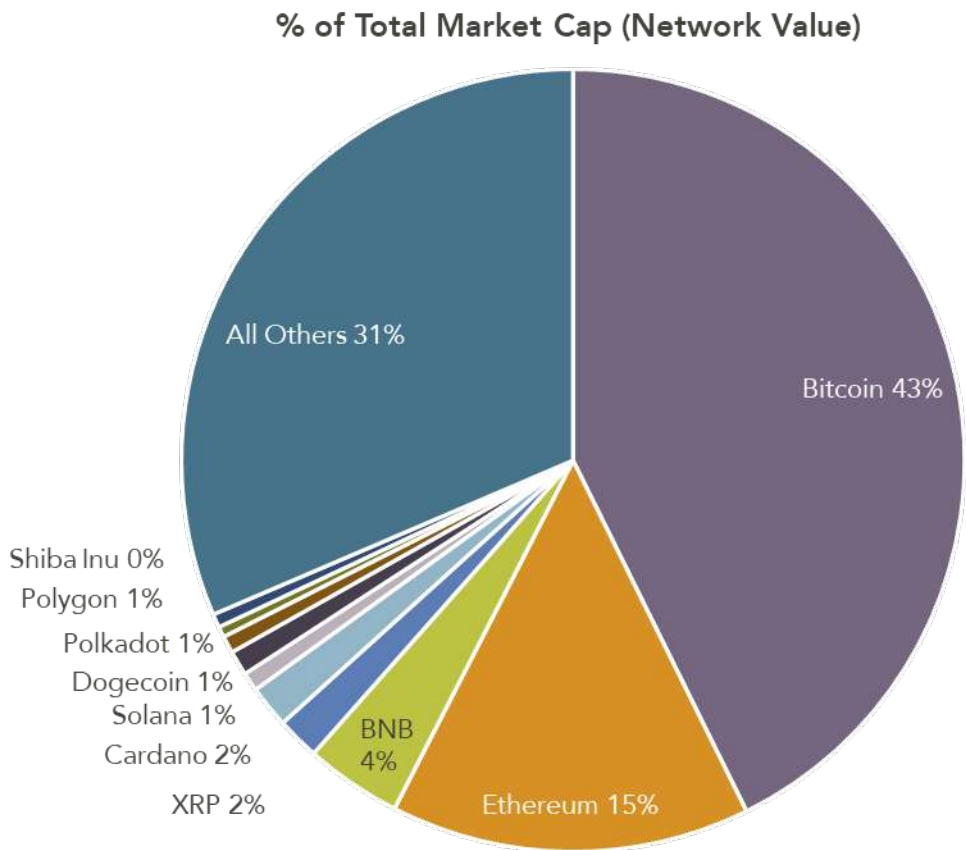
- Cryptocurrencies & Stablecoins
- Smart Contracts, DeFi Tokens, & Tokenized Assets
- The most prominent applications have been categorized into sectors.
 - Codification enables analysis and investment
 - Codification is a dynamic process
- Similar to traditional securities, currencies, and commodities, digital assets and their sectors can be objectively analyzed.
 - Network metrics can be analyzed using on-chain data
 - Market metrics can be analyzed using on-chain data, spot exchange data, and derivative exchange data



Sources: FTSE Russell & DAR, 2021; Messari; MVIS & VanEck

Top 10 digital assets

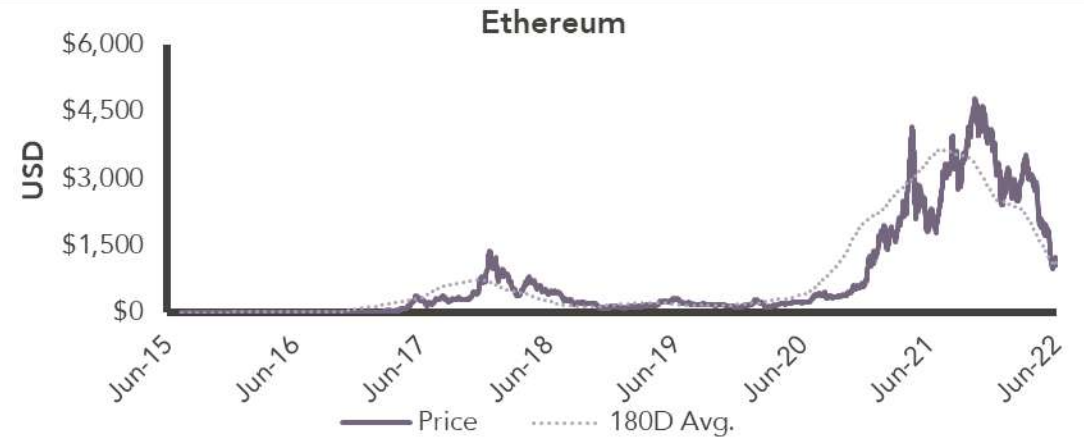
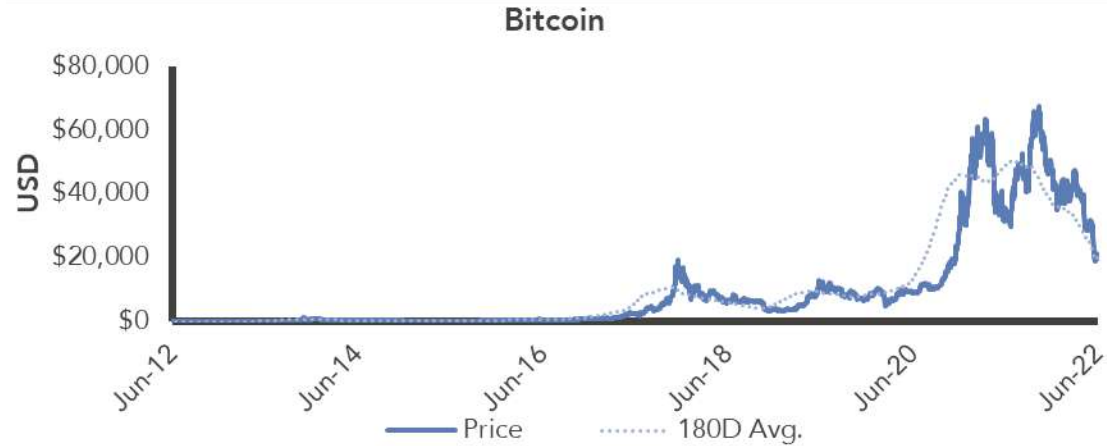
As of September 1, 2022, the aggregate market value of all digital assets totaled \$857.7 billion



| | Spot | Network Value |
|-----------|-------------|---------------|
| Bitcoin | \$20,133.27 | \$383 B |
| Ethereum | \$1,586.51 | \$186 B |
| BNB | \$278.30 | \$45 B |
| XRP | \$0.33 | \$33 B |
| Cardano | \$0.46 | \$15 B |
| Solana | \$31.61 | \$11 B |
| Dogecoin | \$0.06 | \$8 B |
| Polkadot | \$7.18 | \$8 B |
| Shiba Inu | \$0.00001 | \$7 B |
| Polygon | \$0.88 | \$7 B |

Source: Messari as of September 1, 2022

Cryptocurrency & token prices



Source: Messari as of June 30, 2022

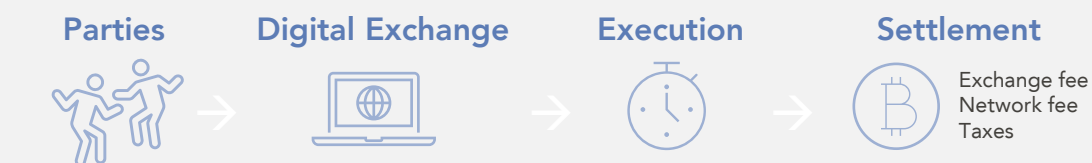
Ethereum & Smart Contracts

- The Ethereum blockchain was created to enable smart contracts and support developers building and running a variety of complex, decentralized applications.
- Smart contracts are blockchain-based self-executing digital contracts with the terms of the agreement (if/then statements) written as executable code.
- Smart contracts remove the need for a central authority, legal system, or external enforcement mechanism.
- Automating conditions, execution, and settlement improves accuracy and speed, removes intermediaries, reduces costs (fees), and decreases fraud and manipulation risks.

TRADITIONAL CONTRACTS



SMART CONTRACTS

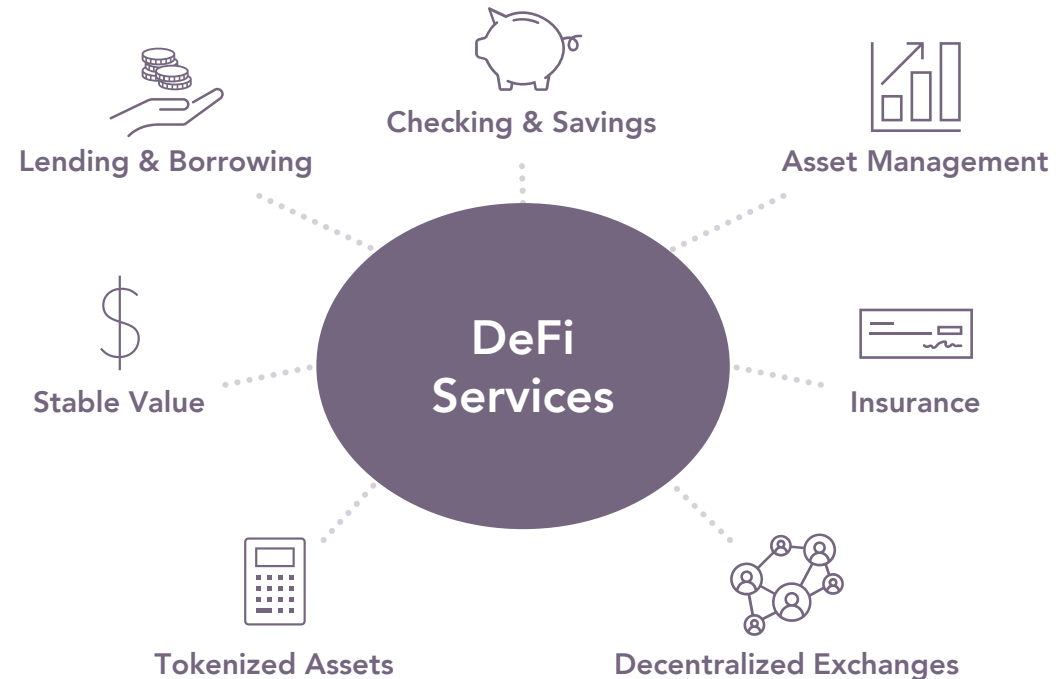


Sources: Bank of International Settlements; JPMorgan Chase; [LeewayHertz](#)

Decentralized Finance (DeFi)

Decentralized finance (DeFi) is a blockchain-based P2P form of traditional financial services, utilizing smart contracts. Like the internet, it is inherently global and enables low-cost financial services for anyone with an internet connection.

- DeFi stands in contrast to CeFi (Centralized Finance), referring to systems controlled by a central authority.
- DeFi services **do not require** financial intermediaries such as brokerages or banks.
- DeFi adoption is growing rapidly in unbanked and underserved countries as people can access DeFi services via mobile connection; expanding and democratizing capital markets.

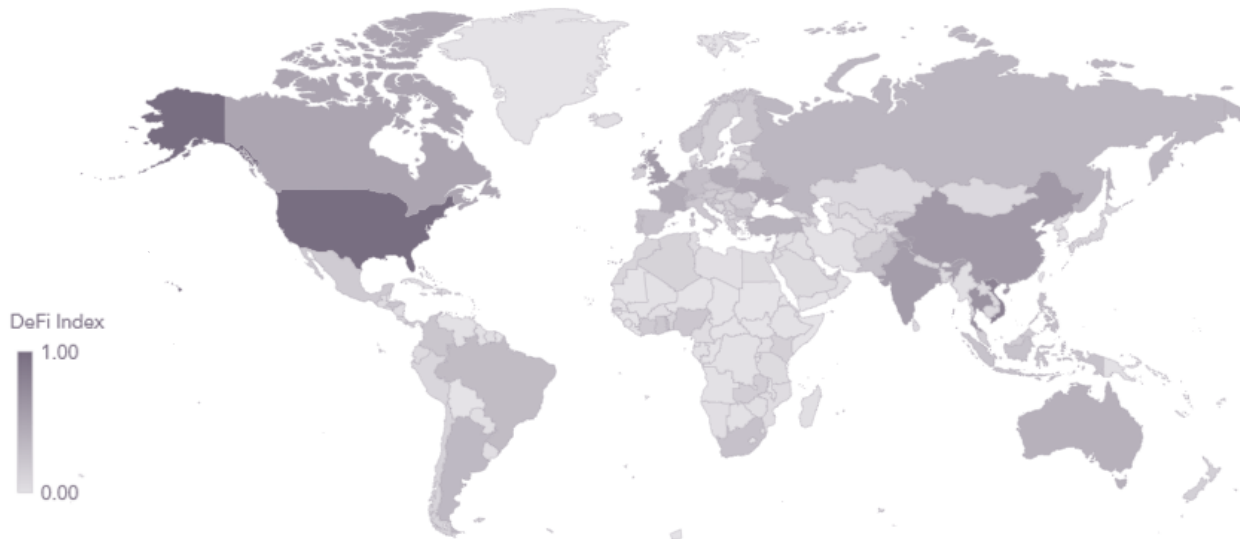


Sources: Bank of International Settlements; [LeewayHertz](#)

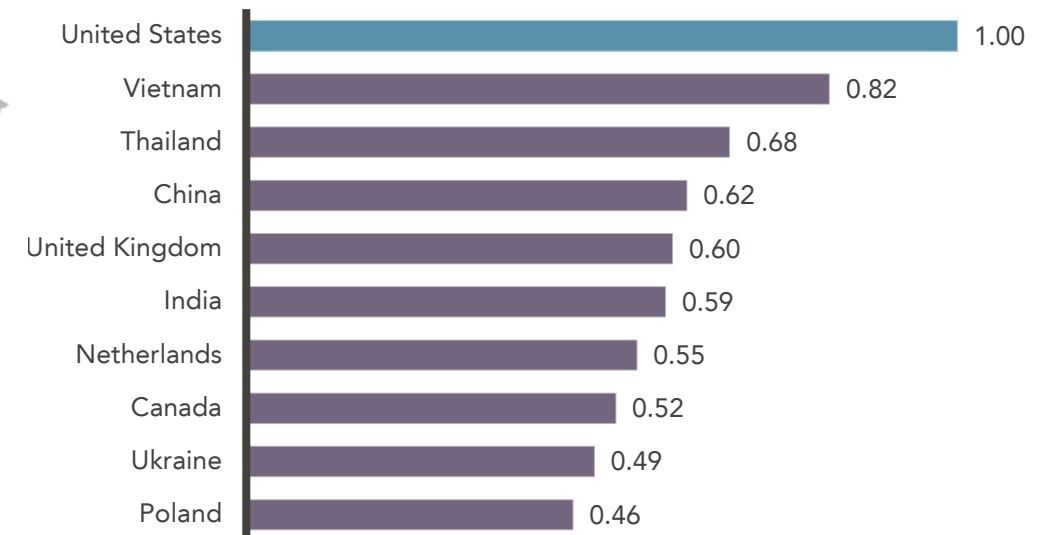
DeFi adoption

- Currently, DeFi is the most prominent crypto application being leveraged by both consumer and commercial entities. DeFi is utilized to enhance both the quality and reach of traditional financial services.
- DeFi networks digitize back-end processes using autonomous smart contract platforms; enabling seamless global services, free of physical constraints or intermediaries.
- While DeFi deployment is most pronounced in developed markets, access to capital is expanding to historically underserved and unserved communities, emerging markets, and frontier markets.

DeFi Adoption by Country



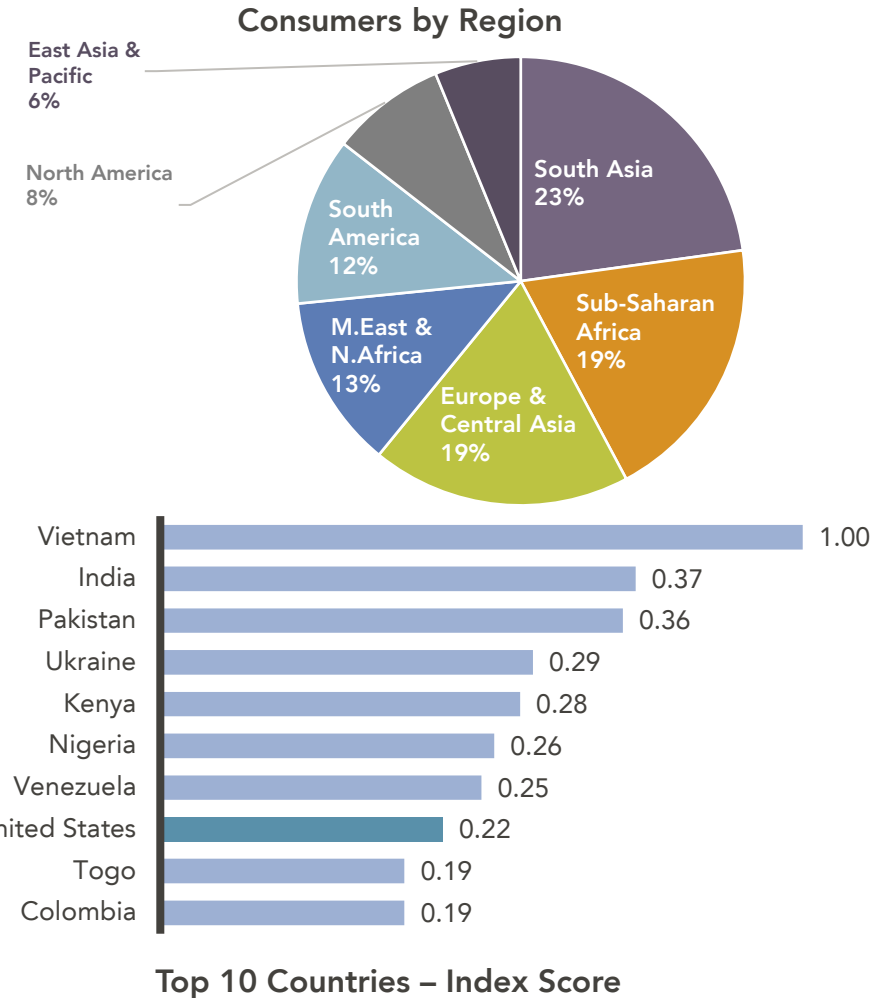
Top 10 Countries – Index Score



Source: The Chainalysis 2021 Geography of Cryptocurrency Report: The 2021 Global Crypto Adoption Index The DeFi methodology for the Chainalysis Index Score referenced above is detailed on slide 41.

Consumer adoption

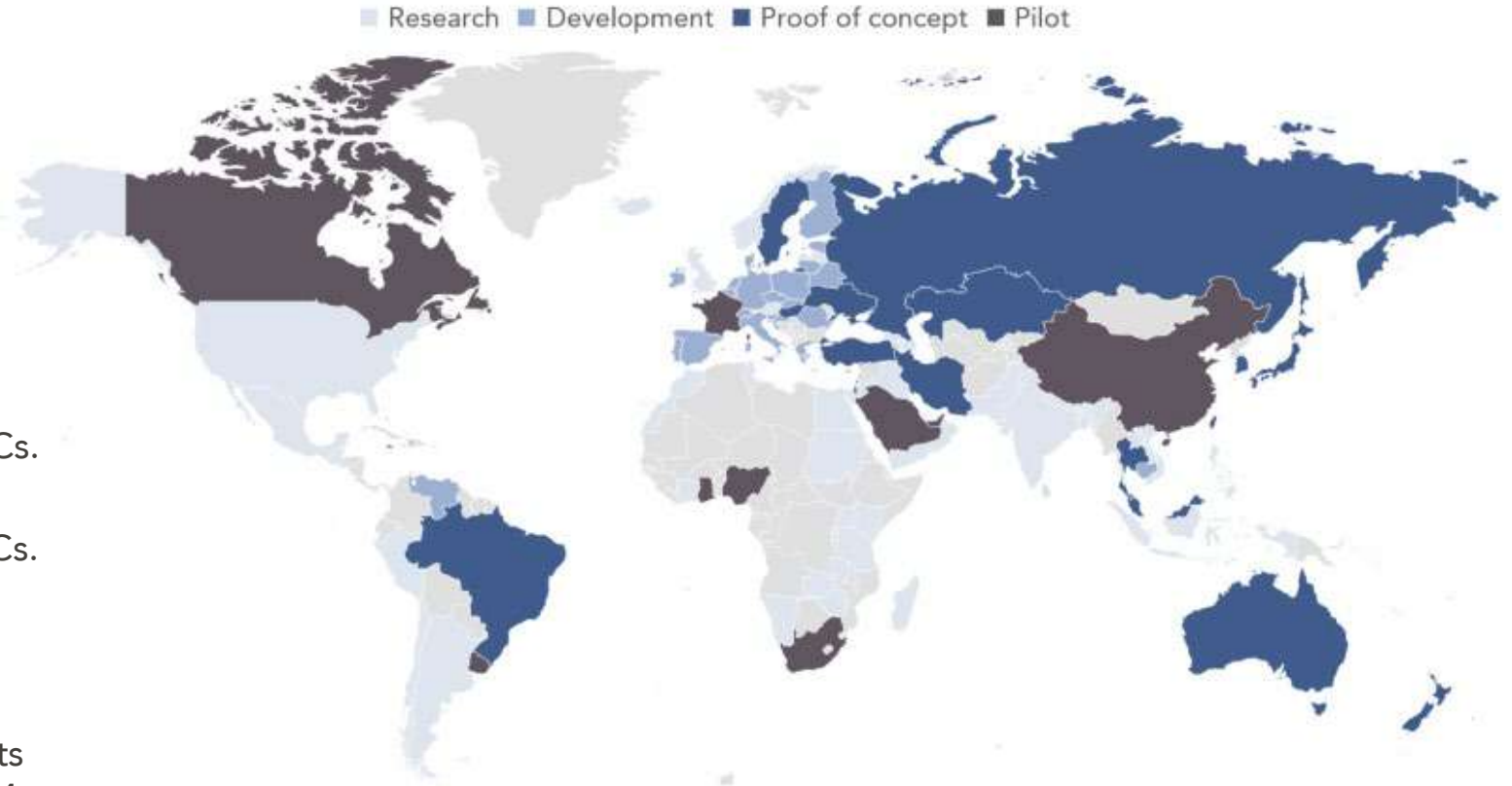
- Global consumer adoption is most profound in frontier and emerging markets.
- Cryptocurrency and DeFi adoption are most prominent in Southern/Central Asia, and Africa.
 - Banking the unbanked and underbanked
 - Cross-border remittances
 - DeFi – access to capital



Source: The Chainalysis 2021 Geography of Cryptocurrency Report: The 2021 Global Crypto Adoption Index. The retail methodology for the Chainalysis Index Score referenced above is detailed at the end of this document.

Sovereign development & adoption

- Central bank digital currencies (CBDCs) are being researched, developed, and, in some cases, piloted for retail and wholesale applications.
- The competitive advantages in terms of cost, speed, and accessibility have been noted to have broad implications for capital markets, reserve currencies, and monetary policy.
 - In 2018, China and Canada were the only G20 countries with proof-of-concept CBDCs.
 - In 2020, China, Canada, and Saudi Arabia were the only G20 countries piloting CBDCs.
 - China's digital yuan (e-CNY) is currently transitioning from pilot to launch in a structured rollout that began in 4Q21.
 - The People's Bank of China (PBOC) expects the e-CNY launch to be completed by 2024.



Sources: IMF; World Bank; OECD; Central bank announcements; CBDCTracker.org; AtlanticCouncil.org/CBDCTracker

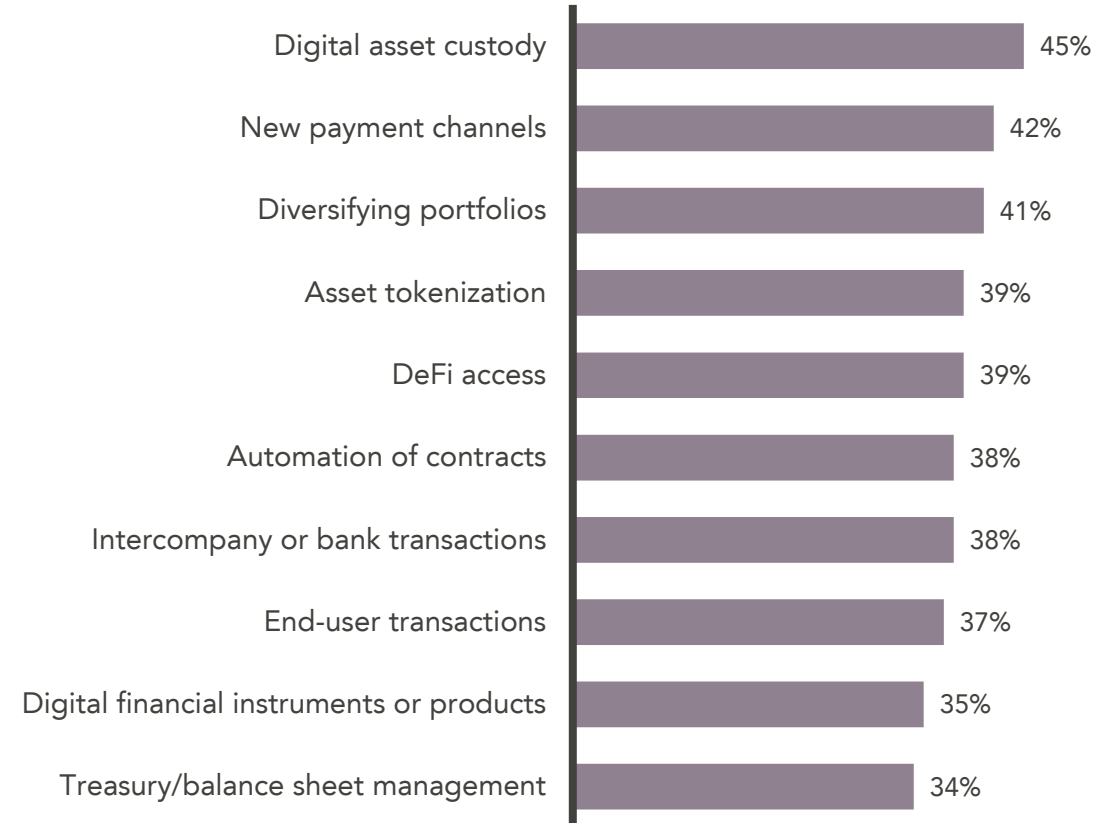
Commercial adoption & appeal

Businesses currently accepting or holding digital assets of any type



Deloitte's 2021 Global Blockchain Survey

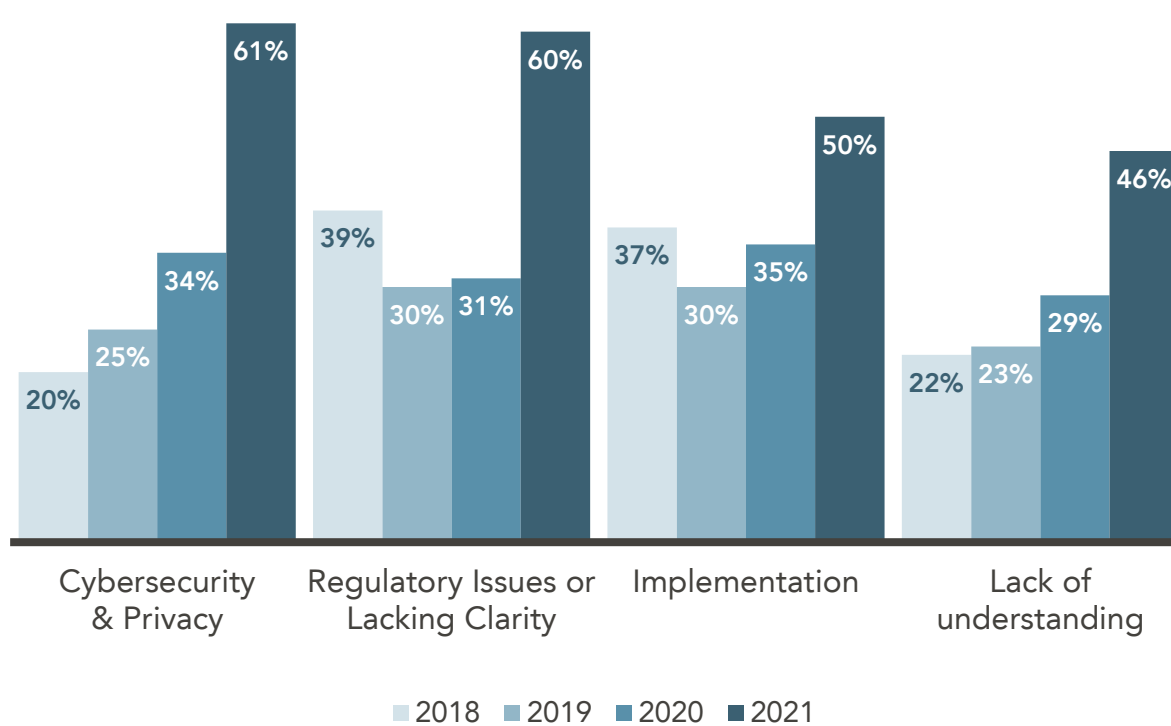
What role will digital assets have in your organization?



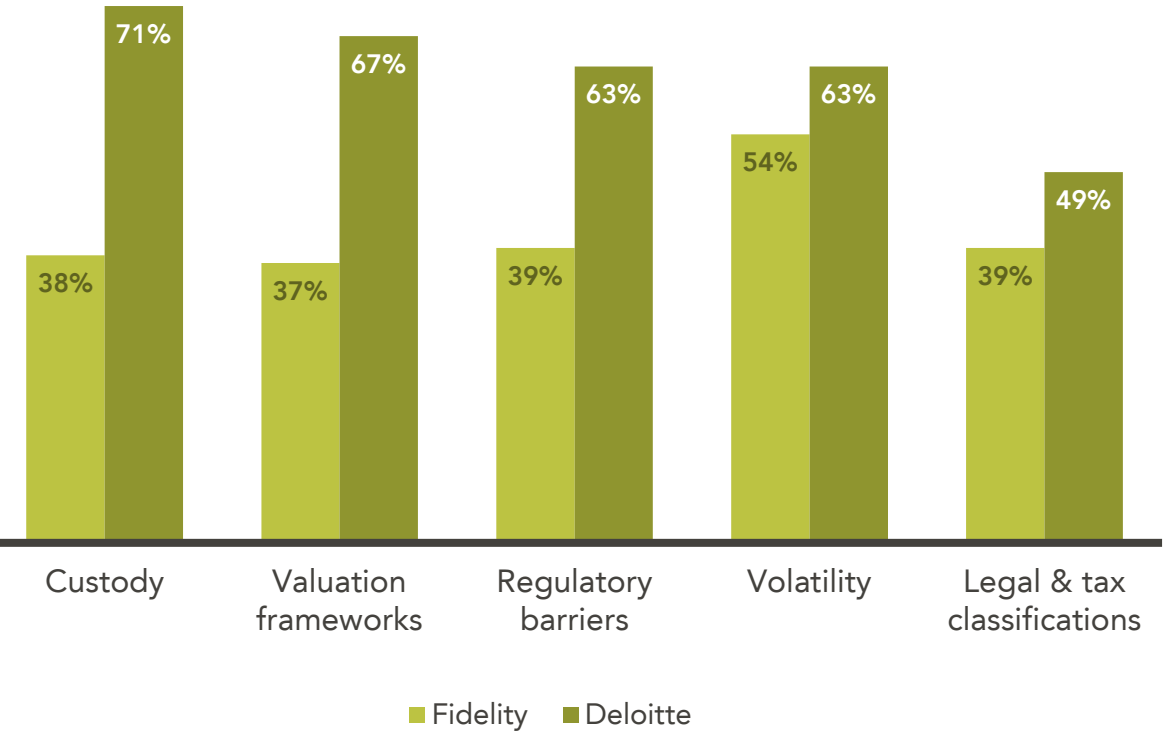
Source: Deloitte's 2021 Global Blockchain Survey

Institutional concerns

Deloitte Survey – YoY Concerns



Institutional Concerns & Headwinds

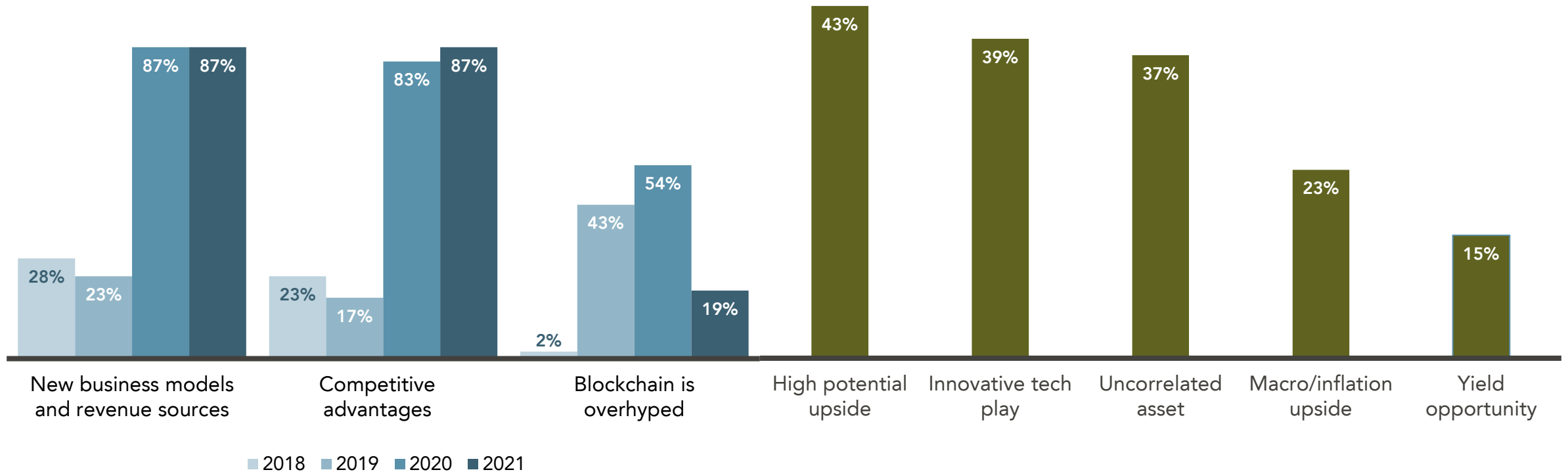


Sources: Fidelity Digital Assets, The Institutional Investor Digital Assets Study, Sept. 2021; Deloitte's 2021 Global Blockchain Survey

Institutional appeal

Deloitte Survey – YoY Appeal

Fidelity 2021 Survey

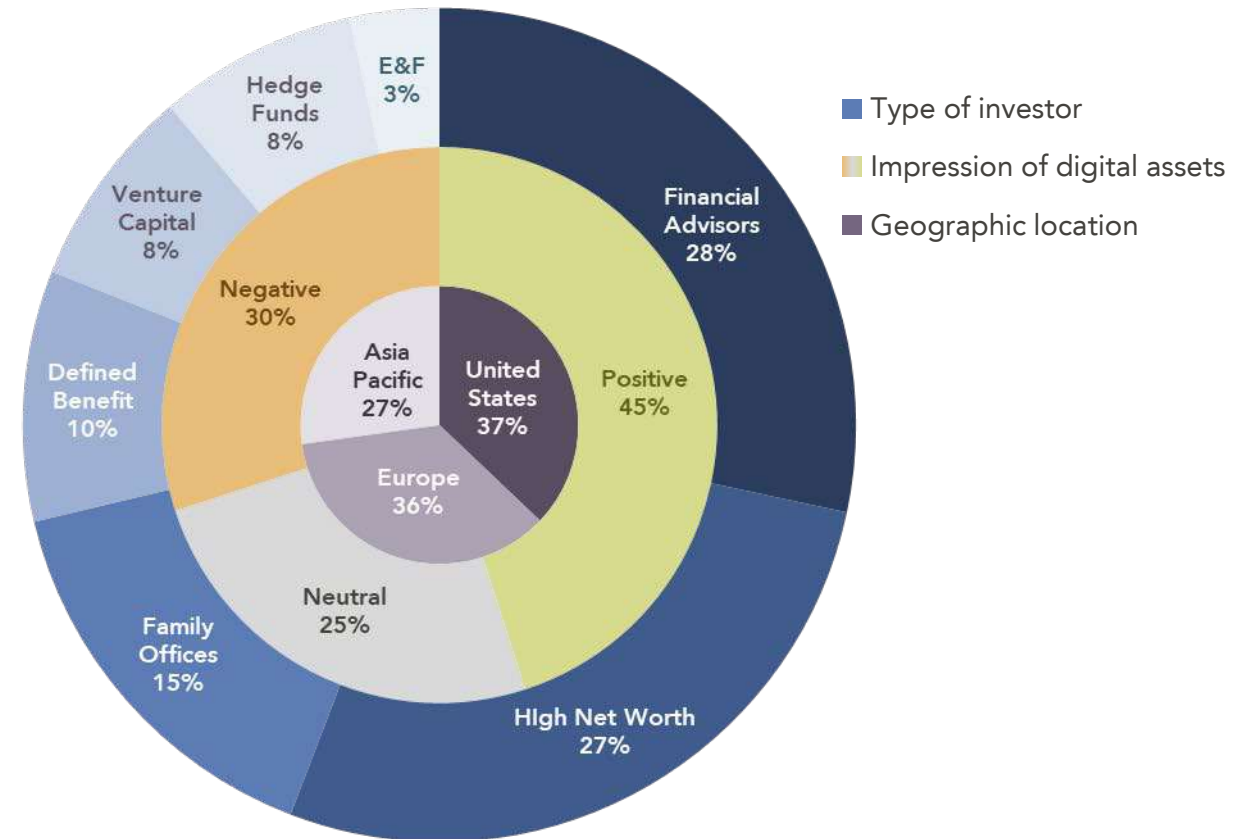
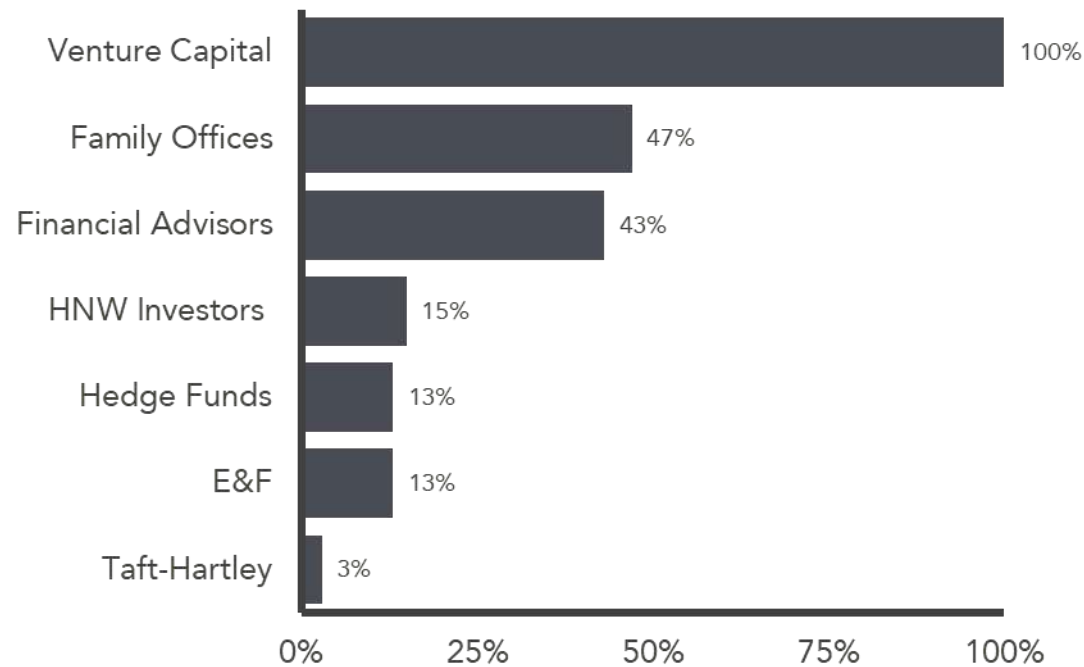


Sources: Fidelity Digital Assets, The Institutional Investor Digital Assets Study, Sept. 2021; Deloitte's 2021 Global Blockchain Survey

Institutional adoption: 2021 global survey

Fidelity Digital Assets surveyed 1,100 institutional investors, globally, through the first half of 2021.

% of U.S. Respondents Investing in Digital Assets

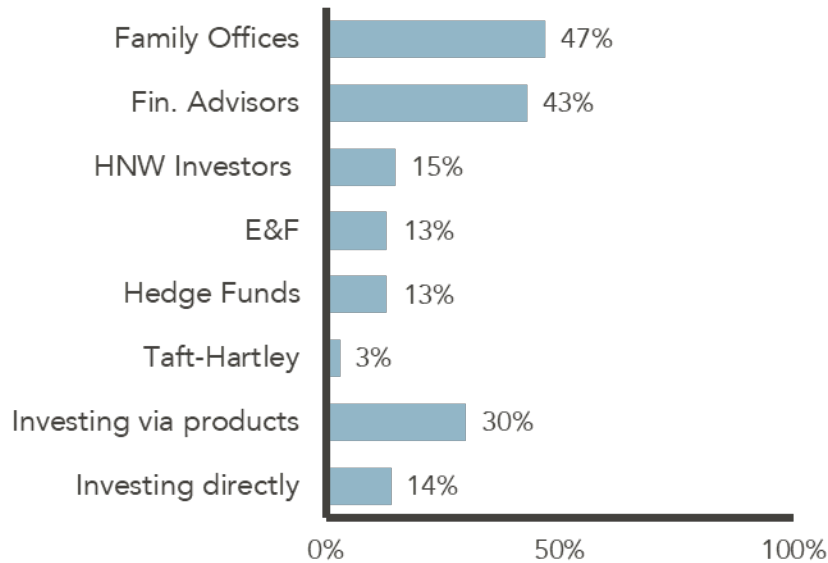


Source: Fidelity Digital Assets, The Institutional Investor Digital Assets Study, September 2021

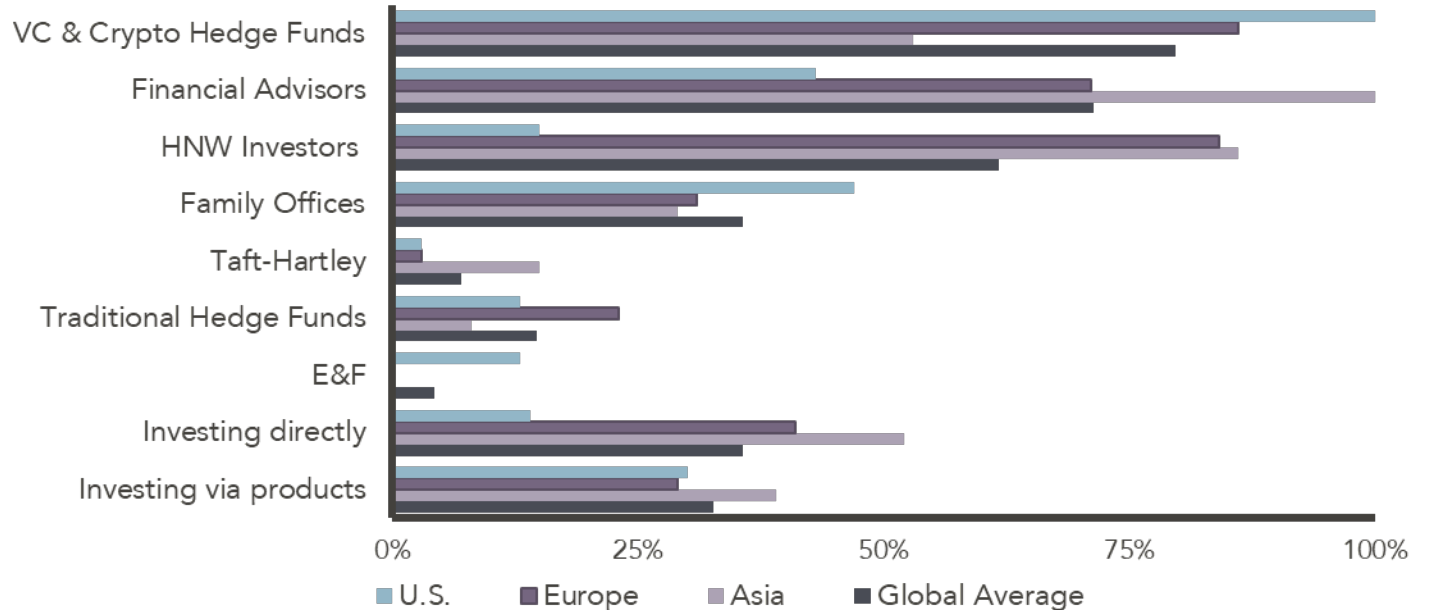
Institutional adoption by type

- Institutional adoption in the U.S. is in its early stages; largely limited to innovators and early adopters.
 - Approximately only 22% of U.S. institutions currently allocate to crypto in any form.
 - Exchange venues and products are limited; no spot ETFs have been approved in the U.S.
- Regulatory ambiguity, misinformation, and skepticism have hindered direct allocations.

U.S. Institutional Investment by Type



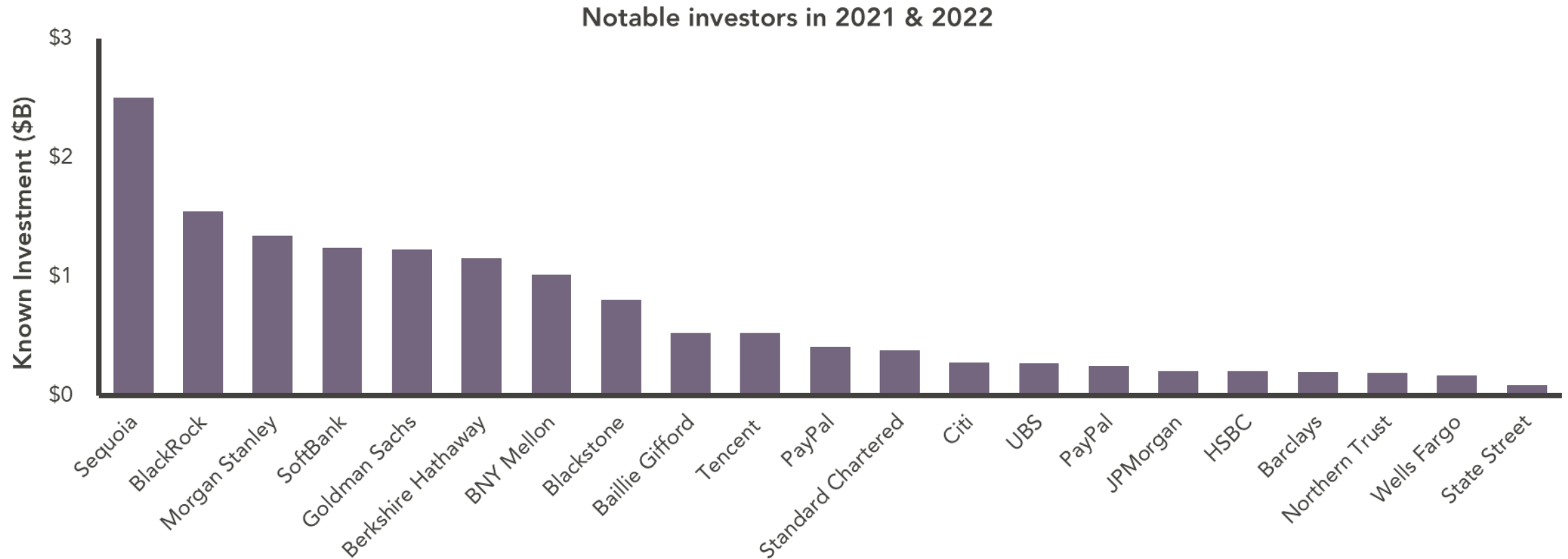
Global Institutional Investment by Type



Sources: The Institutional Investor Digital Assets Study – Fidelity, September 2021; Cryptocurrencies in Retail, Consumer Adoption Report – CryptoRefills

Capital inflows

Market makers have invested broadly despite secondary market dislocations

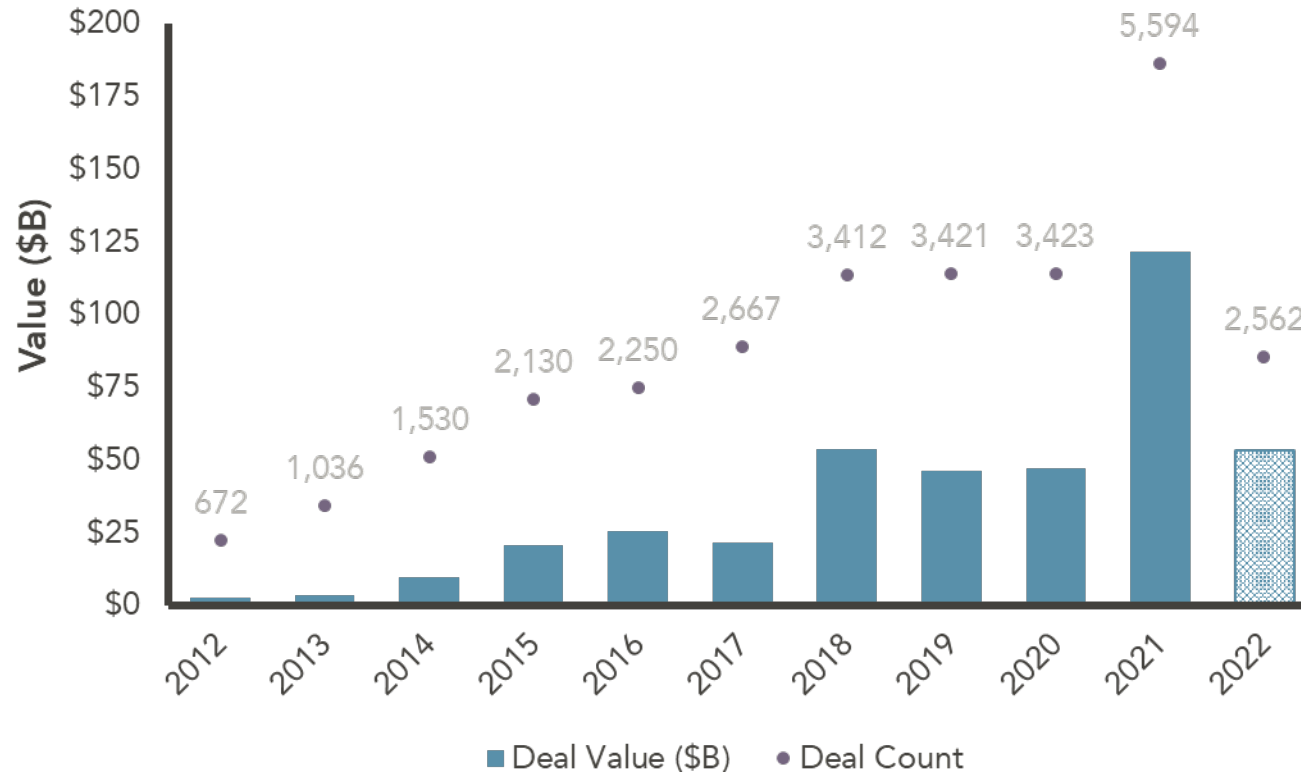


Sources: Business Wire, Pitchbook, CNBC, Reuters

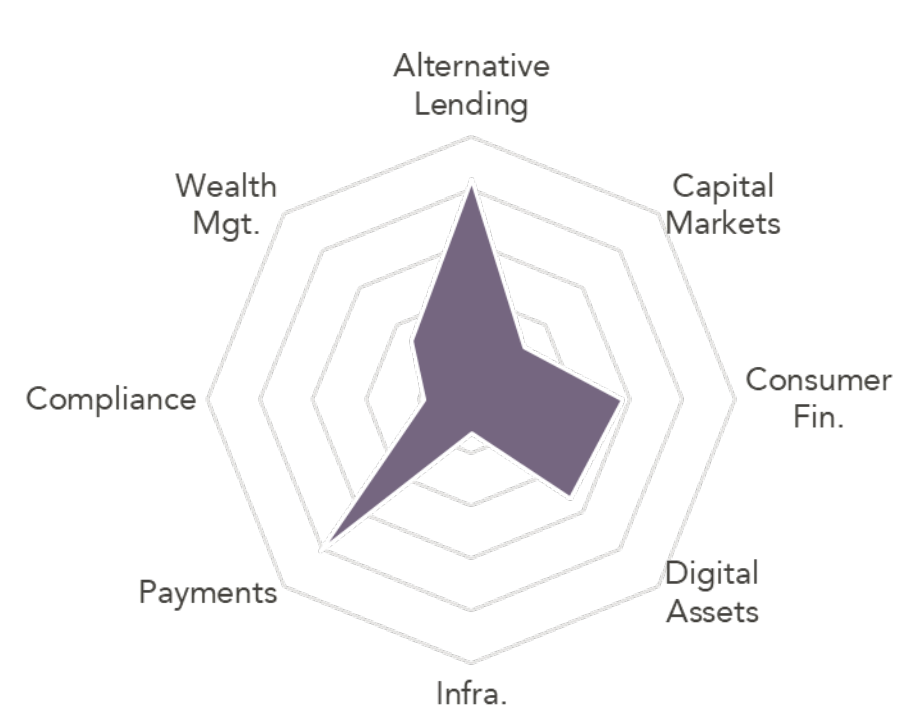
VC snapshot: How is capital being deployed?

Venture Capital offers insight on commercial and institutional appeal

VC Deals by Year



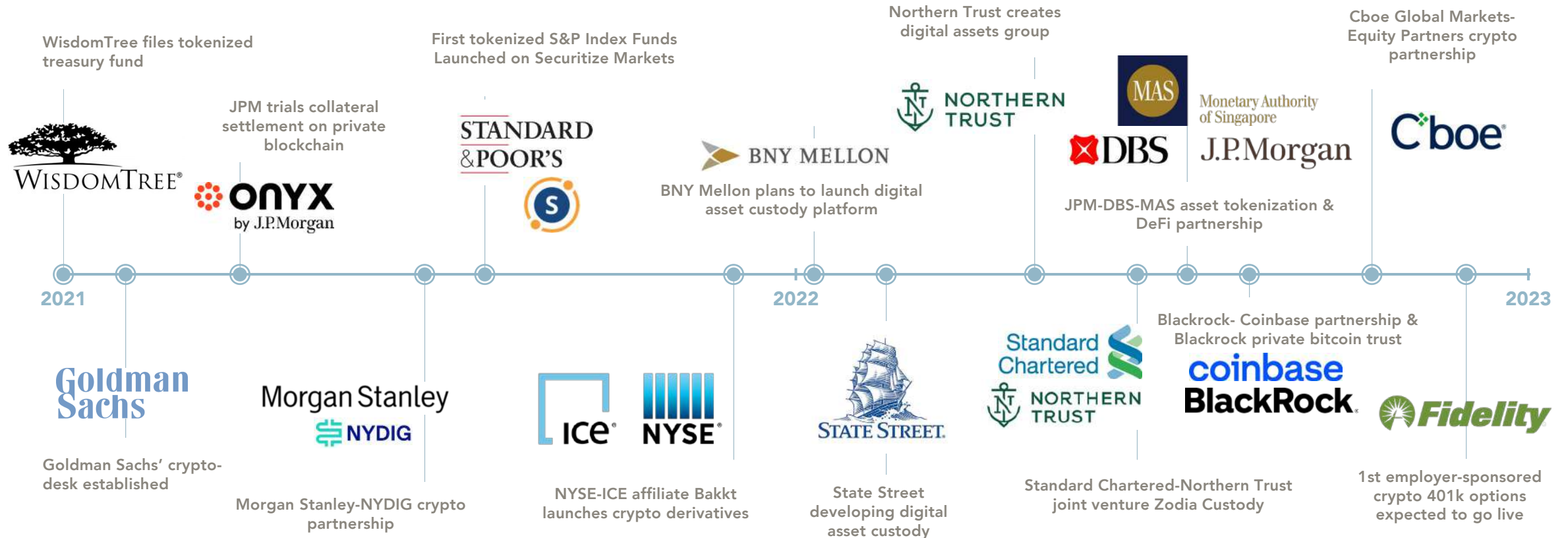
2021 & 2022 Deals by Segment



Source: Pitchbook

2021 & 2022 market-maker timeline

Institutions are building capital market infrastructure & digital asset custody solutions



Sources: Bloomberg, Business Wire, Reuters

Performance & characteristics

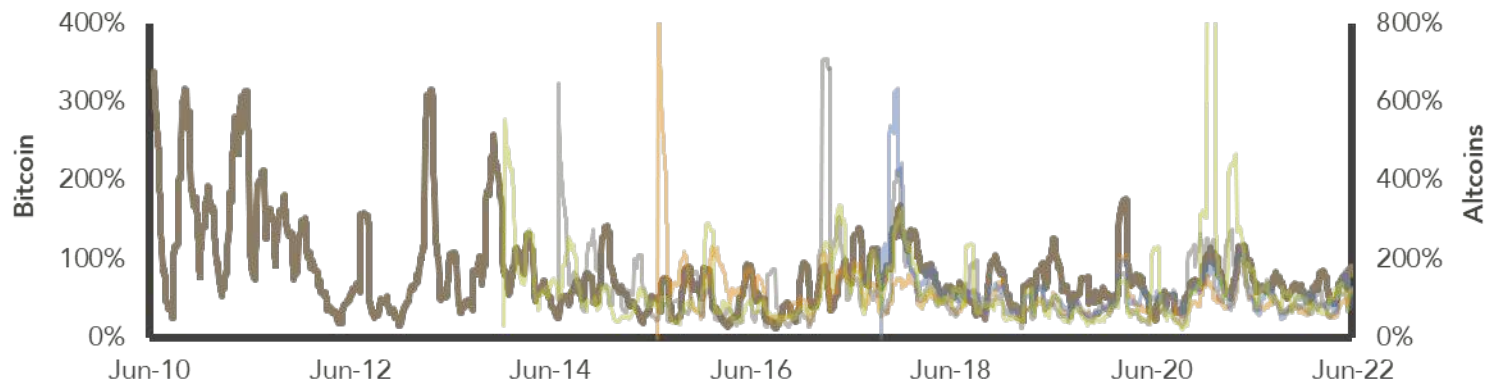
Overview

Risk & return

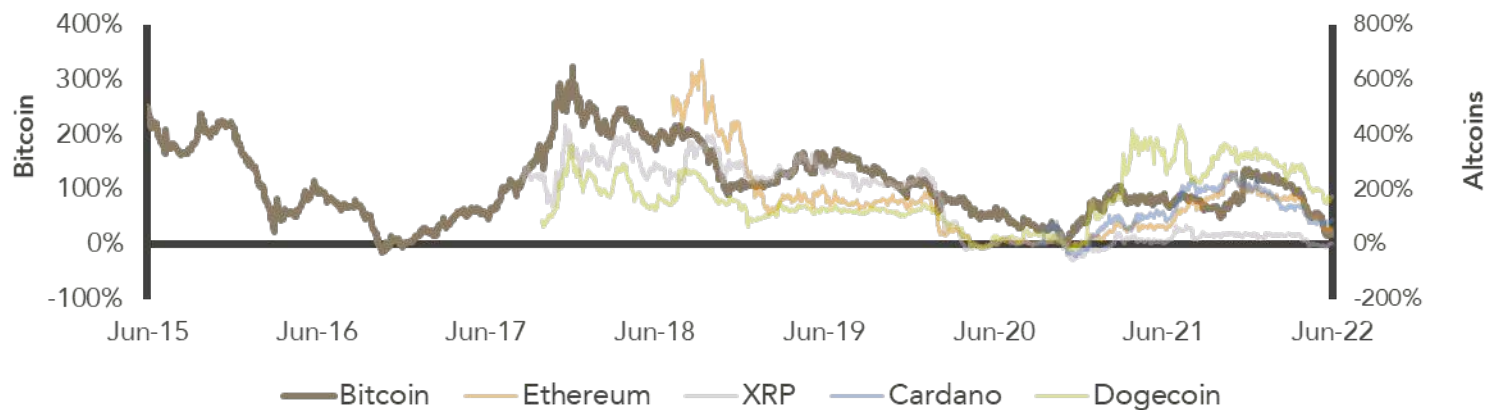
- The risk/return profiles of digital assets are unprecedented as they have displayed both extreme short-term volatility and considerable long-term returns.
 - Cryptos share liquidity-volatility dynamics commonly observed and researched in traditional FX markets.
 - Assets are considered *liquid* when they are easy to buy and sell.
 - The more liquid the asset is, the less volatile it is as price changes are less sudden, less severe, and better absorbed by the market.
- Although volatility is generally most extreme near a coin's inception, the most mature networks to date still feature short-term volatility unparalleled by traditional assets.
 - Currently, crypto markets are illiquid in size and scope relative to the traditional markets.
 - In the U.S., investor on/off ramps are limited as institutional-grade custodians are new to market, and the SEC has not approved any spot-based ETFs.
 - Volatility is intensified globally by margin trading (leverage) in spot and futures markets

Source: Messari as of June 30, 2022

Rolling Risk (30D StDev)



Rolling 3-Year Annualized Returns



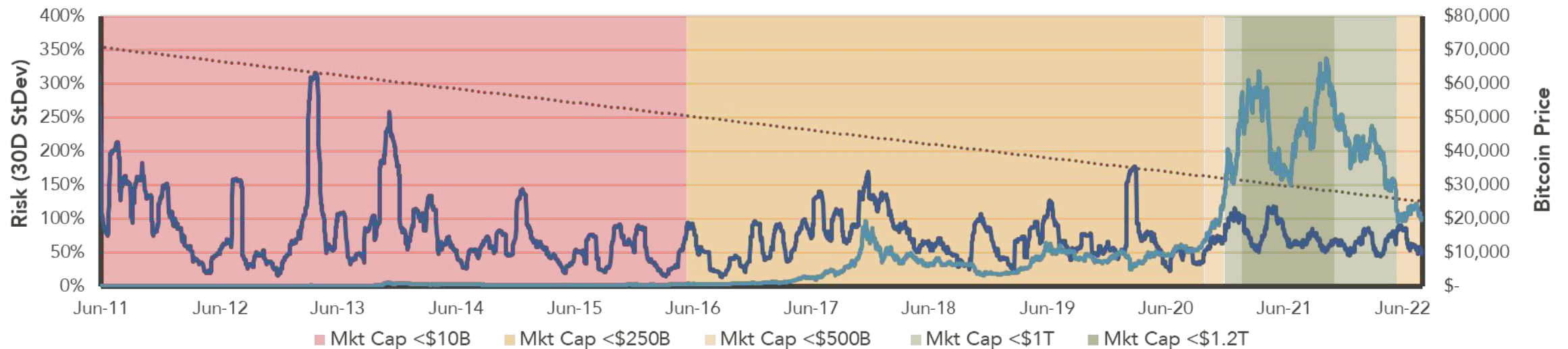
Liquidity & volatility

- In their current state, digital assets are thinly traded and illiquid relative to traditional assets.
 - Similar to commodity and forex markets, illiquidity is a key driver of volatility and characteristic of shallow markets.
- Intuitively, digital assets are most illiquid immediately following inception when they are not easily bought or sold.

Bitcoin as an example

- With a market cap less than \$10B until mid-2016, prices were easily manipulated by large transactions and leverage.
- Illiquidity was suggested by Bitcoin's relatively low network value (market cap).
- Illiquidity was apparent as single transactions triggered large price swings.
- As adoption increased via exchanges, trading, and holding, liquidity followed suit.
- With a market cap exceeding \$1T, Bitcoin's price better absorbs market shocking liquidations with lower volatility.

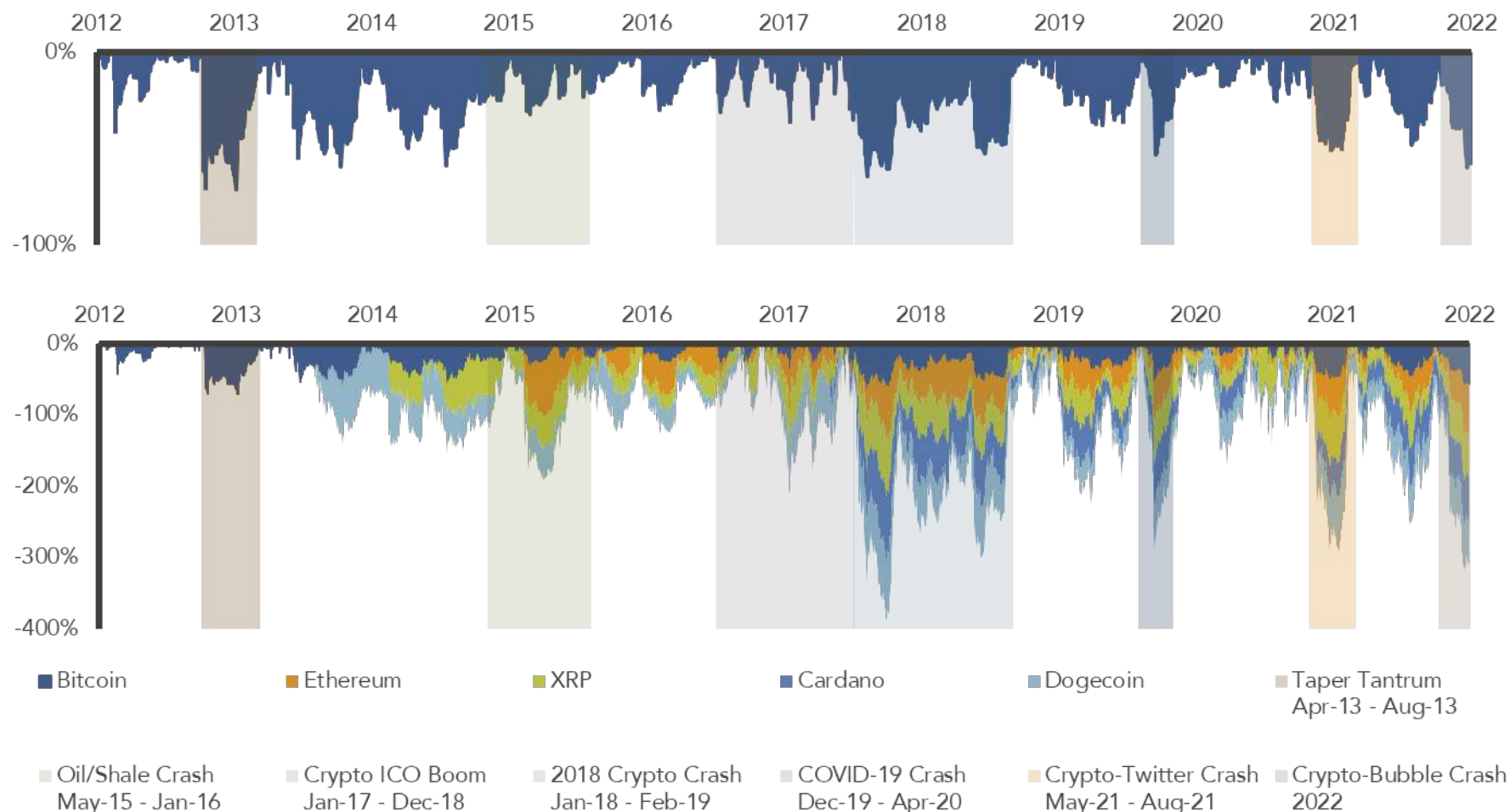
Bitcoin Risk (Dark Blue) & Market Price (Teal)



Source: Messari as of August 31, 2022

Drawdowns

- Crypto drawdowns have been extreme relative to those observed in traditional assets.
- Bitcoin's drawdown severity is considerably less than that of other crypto assets.
- Crypto drawdown severity and frequency appears to have lessened as capitalization and liquidity have improved post-2018.
- Although drawdowns may be improving within the crypto space, they are exceptionally severe relative to traditional assets.

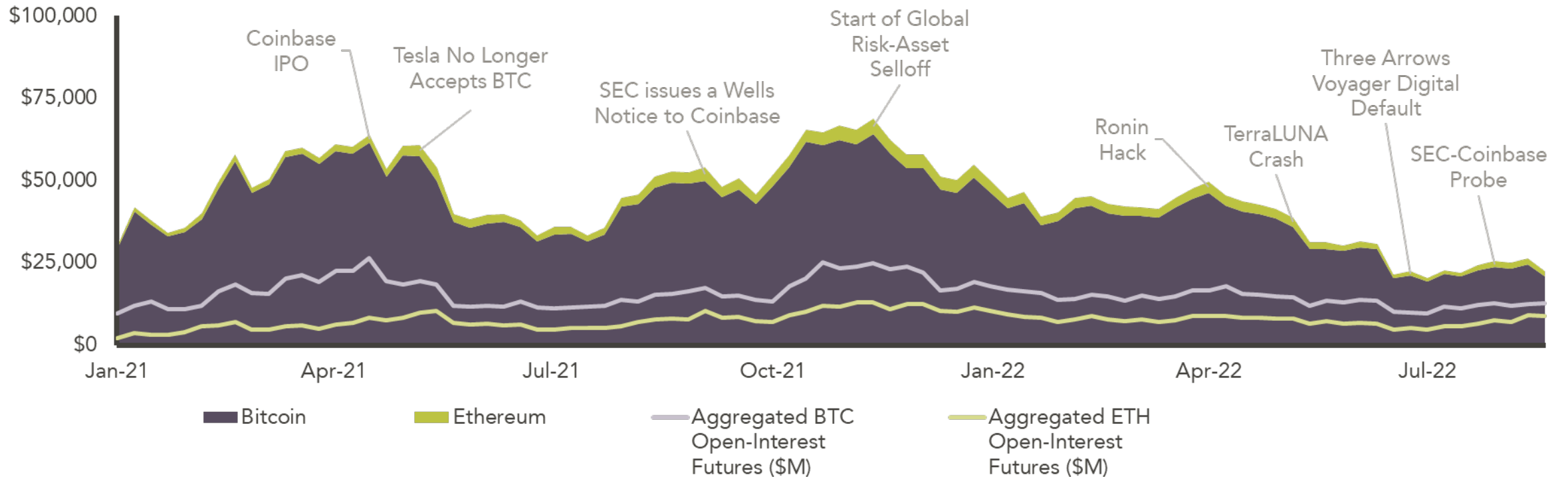


Source: Messari as of June 30, 2022

Crypto crash 2022

Driven by broad sentiment shifts, disruptive market events, and deleveraging

▾ After peaking around \$2.9 trillion in 3Q21, the crypto market shed roughly \$2 trillion in six months

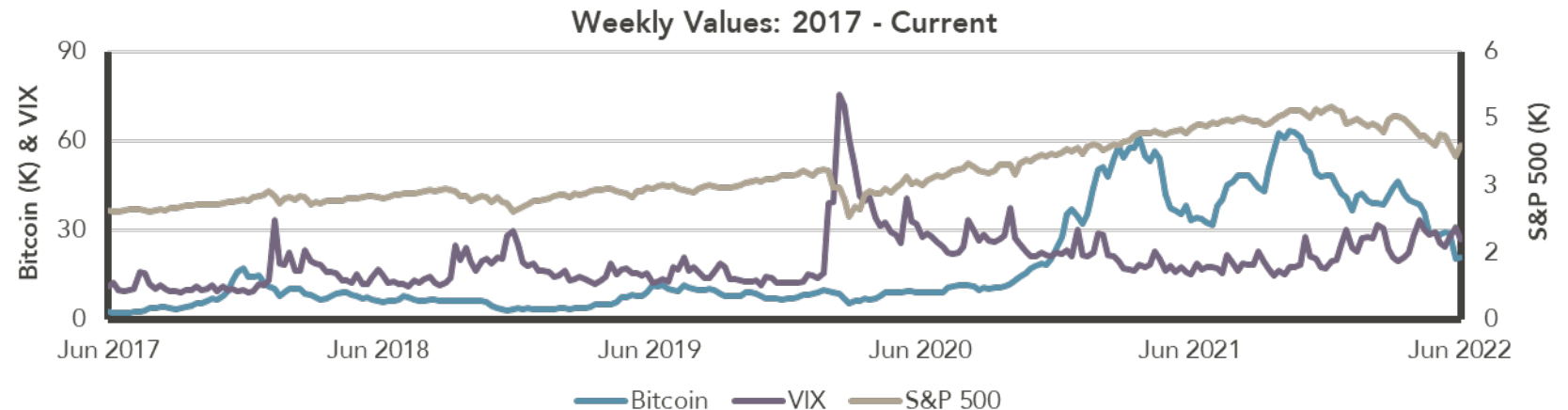


Sources: Messari, Coinglass, Blockdata

Equity correlations

- While Bitcoin's long-term correlation with equities is weak, short-term correlations are mixed and appear to coincide with alignment of sentiment in crypto and equity markets.
- The impact of market sentiment on crypto can be observed in Bitcoin's negative correlation to the CBOE Volatility Index.
 - Crypto is relatively illiquid when compared to traditional assets as it currently lacks the plethora of buyers, sellers, and investment vehicles accessible in traditional markets.
 - Crypto is not isolated from market shocks. Factors which prompt volatility in traditional assets also prompt price changes and liquidations in crypto futures and spot markets.
 - As liquidations spur changes in spot and futures prices, margin calls on leveraged positions often ensue and can cascade into deeper selloffs.

| Bitcoin & Equity | | | | | | | | | | | | |
|---------------------|-----------|------|--------|--------|----------|--------|--------|--------|--------|--------|-----------------|--------|
| | Aggregate | 2022 | 2021 | 2020 | 2019 | 2018 | 2017 | 2016 | 2015 | 2014 | 2013 | 2012 |
| Bitcoin | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| S&P 500 | 0.15 | 0.65 | 0.40 | 0.70 | (0.42) | (0.09) | 0.08 | 0.04 | 0.69 | (0.12) | 0.20 | 0.24 |
| Russell 1000 Growth | 0.13 | 0.58 | 0.33 | 0.63 | (0.41) | (0.11) | 0.30 | (0.01) | 0.64 | (0.01) | 0.16 | 0.20 |
| Russell 2000 Growth | 0.13 | 0.59 | 0.35 | 0.76 | (0.34) | (0.20) | (0.59) | 0.02 | 0.56 | (0.10) | 0.14 | 0.22 |
| MSCI EM Growth | 0.05 | 0.32 | (0.06) | 0.63 | (0.40) | (0.36) | (0.17) | (0.12) | 0.27 | 0.01 | (0.03) | 0.24 |
| CBOE VIX | (0.13) | 0.29 | (0.21) | (0.44) | 0.45 | (0.09) | 0.47 | 0.27 | (0.51) | (0.04) | (0.15) | (0.29) |
| | 1.00 | | 0.75 | | 0.50 | | 0.25 | | 0.00 | | (0.75) | |
| | Perfect | | Strong | | Moderate | | Weak | | None | | Strong negative | |

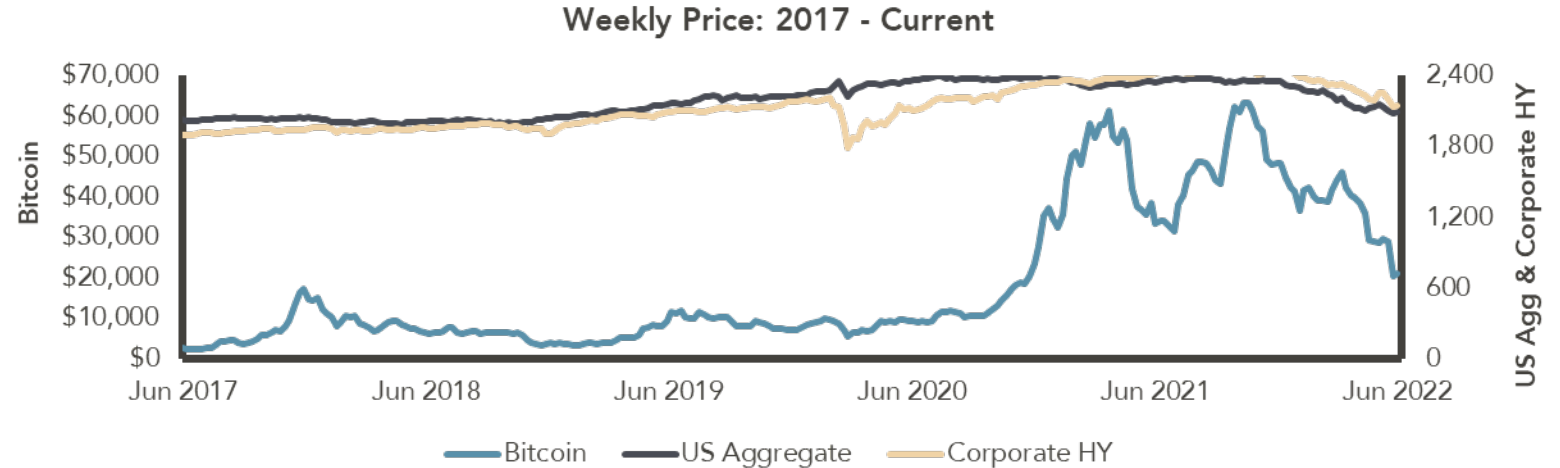


Sources: Messari, Bloomberg, and eVestment (as of June 2022)

Fixed Income correlations

- Bitcoin has demonstrated a long-term poor correlation with Fixed Income investments.
- This trend is commonly referenced in portfolio commentary on Bitcoin as an inflation hedge. While true, it is important to note that Bitcoin's performance has only been observed in a low-rate environment.
- Although Bitcoin observed a strong correlation with Fixed Income in 2019, it appears to be more coincidental than intentional.
 - The crypto crash of 2018 lasted 12 months and was the most severe drawdown in crypto's brief history (See Drawdowns slide for reference).
 - As crypto prices dropped in 2018, the Federal Funds Rate rose from 1.4% to 2.4%.
 - Through 2019, crypto and the Federal Funds Rate ran flat. As crypto began to rebound with institutional inflows in 2020, the Federal Funds Rate declined.

| Bitcoin & Fixed Income | | | | | | | | | | | | | |
|------------------------|-----------|---------|--------|--------|------|----------|--------|--------|--------|--------|------|-----------------|------|
| | Aggregate | 2022 | 2021 | 2020 | 2019 | 2018 | 2017 | 2016 | 2015 | 2014 | 2013 | 2012 | 2011 |
| Bitcoin | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| US Aggregate | 0.05 | (0.02) | (0.39) | (0.39) | 0.34 | 0.33 | (0.30) | 0.57 | (0.04) | (0.60) | 0.45 | 0.10 | 0.37 |
| Global Aggregate | 0.11 | 0.25 | (0.37) | (0.37) | 0.72 | 0.34 | (0.54) | 0.42 | (0.04) | (0.09) | 0.21 | (0.07) | 0.51 |
| US Corporate HY | 0.13 | 0.74 | (0.28) | (0.28) | 0.70 | (0.30) | 0.29 | (0.25) | (0.06) | 0.11 | 0.03 | 0.16 | 0.30 |
| Global Corporate HY | 0.15 | 0.58 | (0.30) | (0.30) | 0.70 | (0.24) | 0.17 | (0.16) | (0.16) | 0.25 | 0.03 | 0.08 | 0.17 |
| US Corporate HY | 0.13 | 0.91 | (0.10) | (0.10) | 0.53 | (0.01) | 0.46 | (0.53) | (0.11) | (0.14) | 0.41 | 0.24 | 0.29 |
| CCC & Lower US HY | 0.13 | 0.29 | (0.06) | (0.06) | 0.62 | (0.21) | 0.30 | (0.29) | 0.01 | (0.02) | 0.22 | 0.17 | 0.20 |
| | | 1.00 | | 0.75 | | 0.50 | | 0.25 | | 0.00 | | (0.75) | |
| | | Perfect | | Strong | | Moderate | | Weak | | None | | Strong negative | |

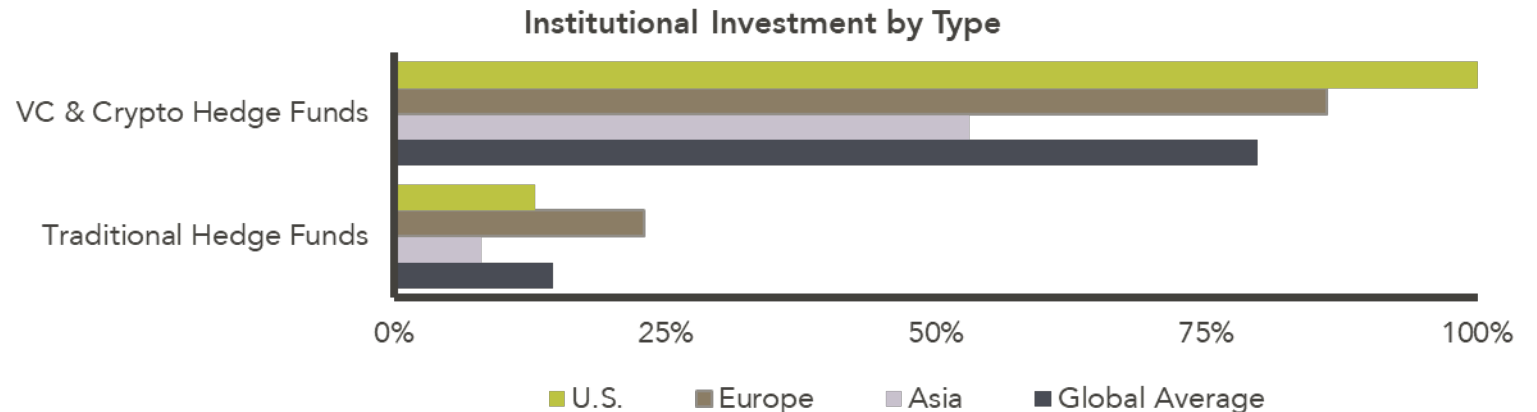


Sources: Messari, Bloomberg, and eVestment as of June 2022

Alternative asset correlations

- Bitcoin's moderate correlation with alternatives is largely attributed to the significant inflows of capital from Venture Capital and Hedge Funds.
- VC firms, notably in Silicon Valley, are the primary capital sources for crypto projects and startups.
 - VC firms invested ~\$650M in crypto in 2021; up from ~\$70M in 2020.
- Hedge Funds with dedicated crypto strategies have been prominent in the crypto space since as early as 2016.
 - Many leverage algorithmic trading models which trade cryptos on digital exchanges 24/7.

| Bitcoin-Alternative Investment Correlations | | | | | | | | | | | | |
|---|-----------|--------|--------|--------|----------|--------|--------|------|--------|--------|-----------------|--------|
| | Aggregate | 2022 | 2021 | 2020 | 2019 | 2018 | 2017 | 2016 | 2015 | 2014 | 2013 | 2012 |
| Bitcoin | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Refinitiv Private Equity | 0.12 | 0.54 | 0.44 | 0.44 | 0.66 | (0.44) | (0.05) | 0.19 | 0.04 | 0.65 | (0.05) | 0.12 |
| Refinitiv Venture Capital | 0.09 | 0.37 | 0.48 | 0.48 | 0.51 | (0.37) | (0.25) | 0.23 | (0.27) | 0.66 | 0.28 | 0.08 |
| HFN Hedge Fund Agg. | 0.17 | 0.85 | 0.26 | 0.26 | 0.77 | (0.35) | (0.08) | 0.18 | 0.21 | 0.28 | 0.09 | 0.23 |
| NAREIT United States | 0.06 | 0.67 | 0.32 | 0.32 | 0.78 | (0.27) | (0.25) | 0.06 | 0.20 | 0.03 | 0.03 | (0.20) |
| NAREIT Global | 0.10 | 0.80 | 0.27 | 0.27 | 0.75 | (0.31) | (0.30) | 0.20 | 0.08 | 0.16 | 0.10 | (0.13) |
| U.S. Dollar Index | 0.31 | (0.89) | 0.41 | (0.79) | 0.54 | (0.70) | (0.62) | 0.50 | 0.52 | (0.69) | (0.26) | 0.05 |
| | 1.00 | | 0.75 | | 0.50 | | 0.25 | | 0.00 | | (0.75) | |
| | Perfect | | Strong | | Moderate | | Weak | | None | | Strong negative | |



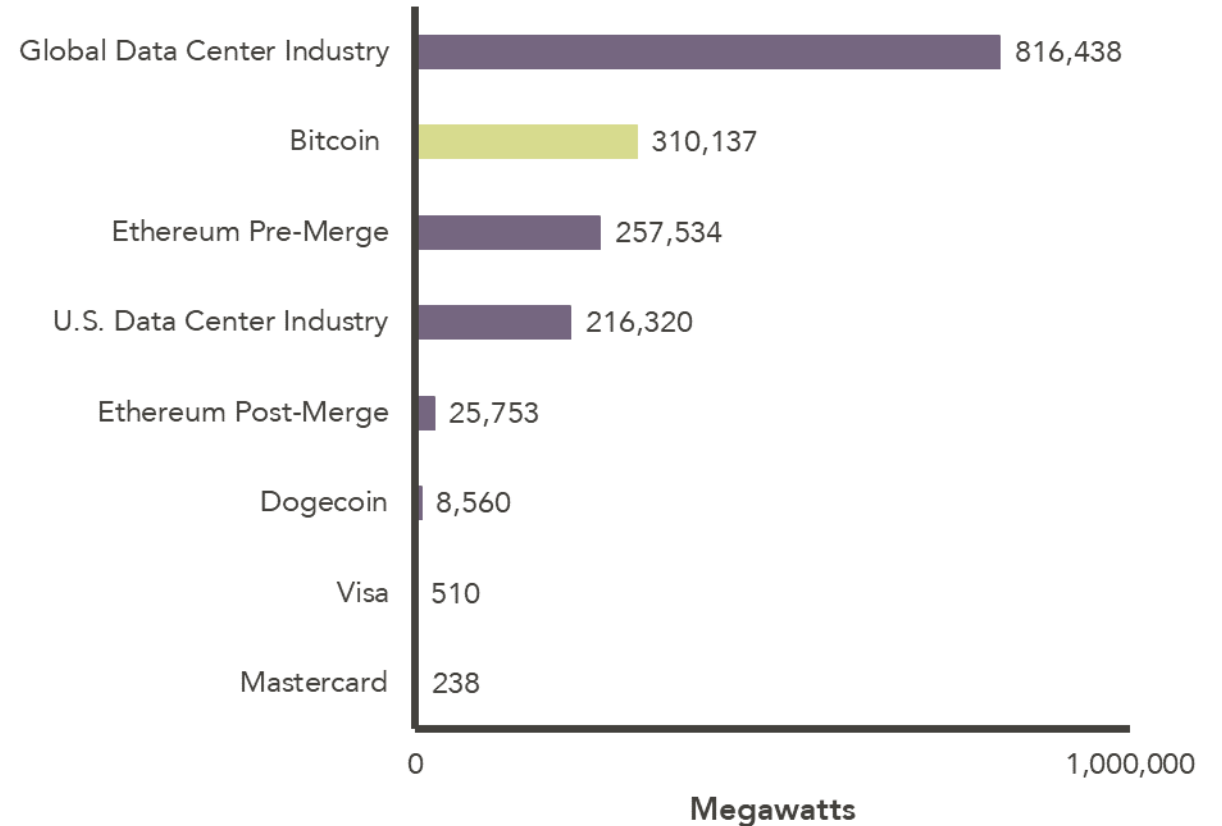
Sources: Messari, Bloomberg, and eVestment

Market Risks

ESG: Environmental concerns

- Environmental concerns are the latest in a rolling series of crypto objections.
 - The Cambridge Center for Alternative Finance estimates the average annualized energy consumption of the bitcoin network at 113.2 TW as of September 13, 2022.
 - A series of energy efficient upgrades have been proposed for the Bitcoin network; while some have been adopted, implementation is ongoing.
- **In Context:** Visa and Mastercard are estimated to use ~0.0008 kWh per transaction.
 - Energy consumption comparisons can be misleading and sometimes incommensurable.
 - While per-transaction comparisons do offer insight, their scope is limited as they are lagging indicators and do not include other network components or functions.

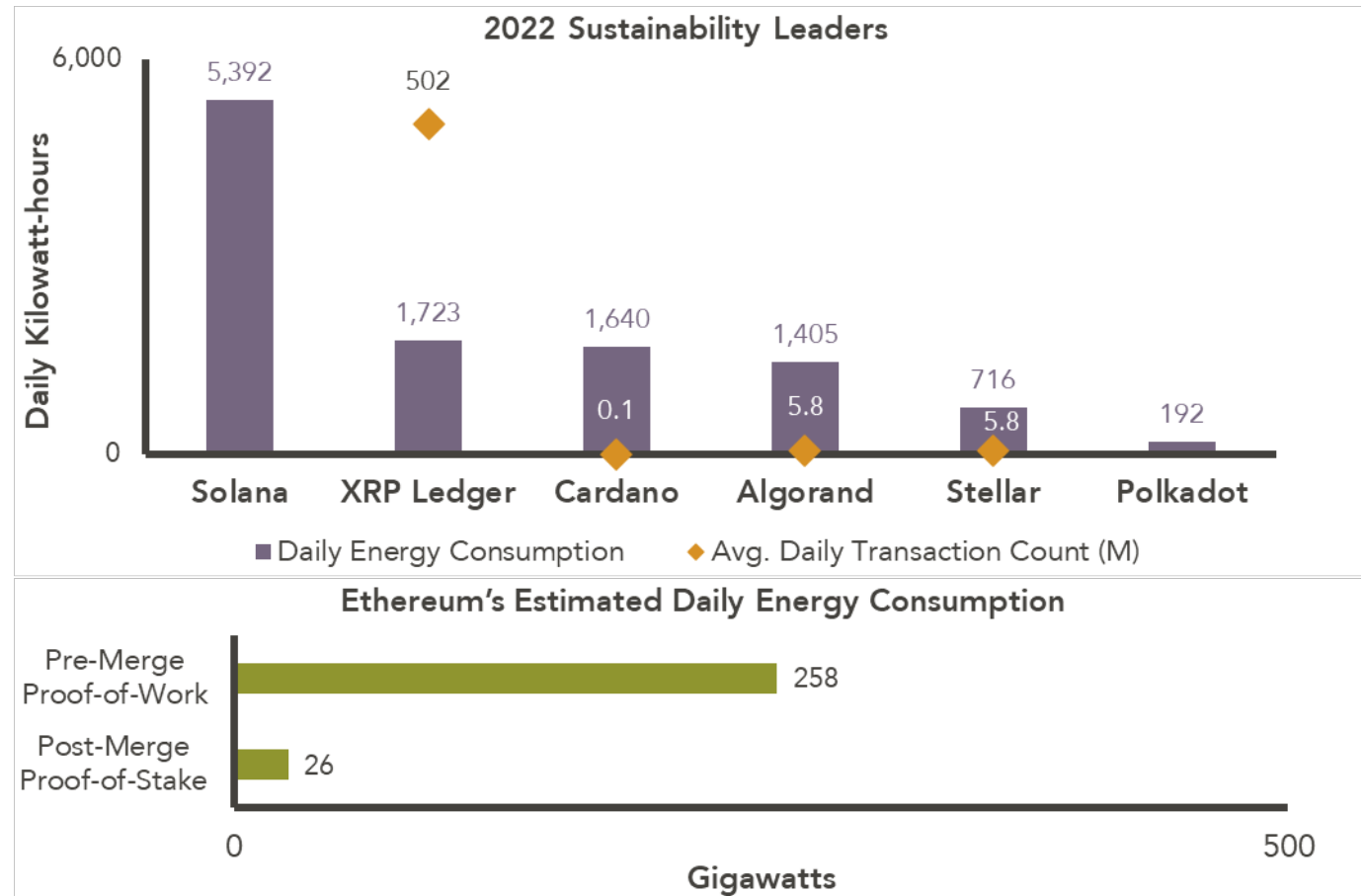
Daily Network Energy Consumption Estimates



Sources: University of Cambridge: Cambridge Center for Alternative Finance; University of California, Berkely; Nasdaq Research; XRPL Carbon Calculator; AKCP; Crypto Carbon Rating Institute; Ethereum Foundation; The White House 2022 Crypto-Assets and Climate Report; CB Insights; Messari; Solana and Polkadot daily transaction count not available on Messari.

ESG: Sustainable network leaders

- Next-generation networks utilizing less energy are both active in the market and being developed.
- The chart on the upper right illustrates some of the most sustainable networks in terms of energy consumption.
 - Polkadot network launched in 2020.
 - Algorand network launched in 2019.
 - Solana network launched in 2020.
 - XRP ledger launched in 2012.
 - Cardano network launched in 2017.
- The chart on the lower right illustrates how network updates can reduce energy consumption.



Sources: University of Cambridge: Cambridge Center for Alternative Finance; University of California, Berkely; Nasdaq Research; XRPL Carbon Calculator; AKCP; Crypto Carbon Rating Institute; Ethereum Foundation; The White House 2022 Crypto-Assets and Climate Report; CB Insights; Messari; Solana and Polkadot daily transaction count not available on Messari.

Risks and considerations

- **Liquidity:** Crypto is relatively illiquid when compared to traditional assets. Although liquidity has and is improving, current market limitations should be considered.
 - A Spot ETF has not yet been approved in the U.S. market.
 - Institutional-grade on/off-ramps via custodians and exchanges are currently limited in size and scope. However, this dynamic is rapidly evolving.
 - Leveraged positions in derivative markets currently outweigh spot trading, compounding the intensity of sell-offs with an ability to create liquidation cascades.
- **Extreme volatility:** The risk profile of cryptos is unparalleled when compared to traditional assets. Cryptos are especially sensitive to swings in sentiment and derivative markets; and the implications of both short-term and long-term volatility should be considered.
 - Bitcoin has an annualized standard deviation of 75% over the last 3 years.
 - Ethereum has an annualized standard deviation of 98% over the last 3 years.
 - XRP has an annualized standard deviation of 121% over the last 3 years.
- **Valuation:** Though the USD and other fiat currencies have abandoned the gold standard, they are still backed by the “full faith and credit” of their government.
 - Cryptos lack intrinsic value as it is commonly associated with equities, businesses, and cash-flow.
 - Many are not issued, backed, or controlled by any government, bank, or other central authority.
 - Extrinsic valuation methods offer frameworks for fundamental analysis. However, fundamental metrics vary by asset and use case.

Risks and considerations (cont.)

- **Market manipulation:** Many manipulative market behaviors prohibited in traditional markets are not yet illegal or restricted in digital exchanges. The following behaviors are present to various degrees on digital exchanges globally.
 - Wash Trading/Churning: excessively buying and selling assets between accounts in order to generate misleading price and volume data.
 - Layering: entering orders at different price depths to give market participants a false impression of the level of supply or demand.
 - Spoofing: entering false orders without the intent to trade and with the intent to alter market behavior.
 - Pump & Dump schemes: “pumping” prices with asset purchases or misleading information and “dumping” the asset at an inflated price.
- **Regulatory uncertainty:** Although government policies and actions vary widely, globally, digital assets are largely unregulated. In the U.S., regulator guidance, policies, and actions have been mixed at market, firm, and individual levels.
 - The Securities and Exchange Commission relies on the “Howey Test” to determine if a digital asset is a security. All initial coin offerings (ICOs) are treated as securities, except Bitcoin.
 - Although the CFTC has limited regulatory oversight over digital assets, it has full authority to engage in anti-fraud and anti-manipulation enforcement actions in markets where digital assets are traded as a commodity in interstate commerce or traded for future rather than immediate delivery.
 - SEC and CFTC leaders repeatedly cited a need for congressional crypto-specific legislation to adequately regulate digital assets in 2020 and 2021. Crypto industry leaders appeared before the Senate Committee on Banking, Housing, and Urban Affairs and the House Financial Services Committee in December 2021; committee inquiries are ongoing.
 - Market participants are actively lobbying for “rules of the road” that promote growth, innovation, compliance and investor protections akin to The Securities Act of 1933 and the Telecommunications Act of 1996.
- **Custody:** Federal Deposit Insurance Corporation or Securities Investor Protection Corporation protections do not currently include crypto. However, most custodians offer competitive standard insurance policies and additional coverage options.

Key Takeaways

- There is commonality between internet and crypto adoption
- Illicit-activity narratives are often overstated or misleading
- *What are blockchains:* Ledgers of account distributed across and reconciled by a digital network
- *How do blockchains work:* Authorized computers (nodes) validate transactions and maintain a (distributed) ledger
- *Why do blockchains require cryptocurrency:* As (1) a native unit of account and (2) an incentive for validators
- *Why do crypto exchanges exist:* Initially developed to simplify transactions and provide liquidity
- Cryptocurrencies have grown and evolved into an aspiring asset class – digital assets
- Like software and telecom networks, digital assets offer extrinsic value based on use case, adoption, and network development
- Digital asset can be divided into super and subsectors
- *What are smart contracts:* Smart contracts are blockchain-based self-executing contracts
- *What is DeFi:* Decentralized blockchain-based P2P form of traditional financial services
- DeFi adoption is accelerating in developed and emerging markets
- Consumer adoption is most profound in frontier and emerging markets
- Sovereign adoption is currently led by China, Canada, and Saudi Arabia
- Commercial adoption to date is driven by payment and custody solutions
- Institutions find new business models and competitive advantages appealing, but skepticism remains.
- Institutional adoption in the U.S. is in its early stages; largely limited to innovators and early adopters.
- Despite the 2022 market drawdown, market makers continue to deploy capital – focusing largely on payments, custody, and DeFi solutions.
- Digital assets have demonstrated strong correlations with risk assets and the USD Index in recent years.
- Strong narratives and environmental concerns regarding power consumption have emerged.
- Energy consumption comparisons can be misleading and sometimes incommensurable.
- Next-generation networks utilizing sustainable energy are both active in the market and being developed, some with energy footprints comparable to the current Visa or Mastercard networks.

Q&A

Thank you for joining us!

Disclosures

Marquette Associates, Inc. ("Marquette") has prepared this document for the exclusive use by the client or third party for which it was prepared. The information herein was obtained from various sources, including but not limited to third party investment managers, the client's custodian(s) accounting statements, commercially available databases, and other economic and financial market data sources.

The sources of information used in this document are believed to be reliable. Marquette has not independently verified all of the information in this document and its accuracy cannot be guaranteed. Marquette accepts no liability for any direct or consequential losses arising from its use. The information provided herein is as of the date appearing in this material only and is subject to change without prior notice. Thus, all such information is subject to independent verification and we urge clients to compare the information set forth in this statement with the statements you receive directly from the custodian in order to ensure accuracy of all account information. Past performance does not guarantee future results and investing involves risk of loss. No graph, chart, or formula can, in and of itself, be used to determine which securities or investments to buy or sell.

Forward-looking statements, including without limitation any statement or prediction about a future event contained in this presentation, are based on a variety of estimates and assumptions by Marquette, including, but not limited to, estimates of future operating results, the value of assets and market conditions. These estimates and assumptions, including the risk assessments and projections referenced, are inherently uncertain and are subject to numerous business, industry, market, regulatory, geopolitical, competitive, and financial risks that are outside of Marquette's control. There can be no assurance that the assumptions made in connection with any forward-looking statement will prove accurate, and actual results may differ materially.

The inclusion of any forward-looking statement herein should not be regarded as an indication that Marquette considers forward-looking statements to be a reliable prediction of future events. The views contained herein are those of Marquette and should not be taken as financial advice or a recommendation to buy or sell any security. Any forecasts, figures, opinions or investment techniques and strategies described are intended for informational purposes only. They are based on certain assumptions and current market conditions, and although accurate at the time of writing, are subject to change without prior notice. Opinions, estimates, projections, and comments on financial market trends constitute our judgment and are subject to change without notice. Marquette expressly disclaims all liability in respect to actions taken based on any or all of the information included or referenced in this document. **The information is being provided based on the understanding that each recipient has sufficient knowledge and experience to evaluate the merits and risks of investing.**

Sources utilized:

- Forbes
- CFA Society
- Securities.io, David Hamilton
- ARK Investment Management
- Marshall Wace
- Investopedia
- Wall Street Journal
- Coinbase
- CoinDesk
- Blockgeeks
- Fortune
- Fidelity
- EY
- PwC
- Deloitte
- Messari
- Glassnode
- Chainalysis
- CB Insights
- Atlantic Council Research
- Bank of International Settlements
- The World Bank
- International Monetary Fund
- MVISVanEck
- FTSE Russell
- Digital Asset Review
- Coin Market Cap
- Bloomberg
- eVestment
- Yahoo Finance
- Internet World Stats
- Blockchain.com
- TheStreet, Luke Conway
- BMO, David Sneyd
- BNY Mellon
- LeewayHertz
- Illustrations via maxpixel.net

Chainalysis Index Methodologies

Retail Index Methodology

- 157 countries were ranked according to three metrics.
 - On-chain cryptocurrency value received, weighted by purchasing power parity (PPP) per capita
 - On-chain retail value received, weighted by PPP per capita
 - Peer-to-peer (P2P) exchange trade volume, weighted by PPP per capita and number of internet users
- The geometric mean of each country's rank was normalized for a scale of 0 – 1 for an overall score. The highest-ranking country has a value of 1.

DeFi Index Methodology

- 157 countries were ranked according to three metrics.
 - On-chain cryptocurrency value received by DeFi platforms weighted by PPP per capita,
 - Total retail value received by DeFi platforms.
 - Individual deposits to DeFi platforms weighted by PPP per capita.
- The geometric mean of each country's rank was normalized for a scale of 0 – 1 for an overall score. The highest-ranking country has a value of 1.

Source: The Chainalysis 2021 Geography of Cryptocurrency Report: The 2021 Global Crypto Adoption Index

2022 Daily Energy Consumption Estimate Appendix

| Daily Energy Estimate | | | | | | |
|---|---------------------|--|-----------------|------|----------------|----------------|
| Network | kWh per transaction | 1Yr transaction count Sept 14, 2021 – Sept 13, 2022 | 1Yr kWh | Days | Daily kWh Avg. | Daily MWh Avg. |
| Global Data Center Industry | N/A | N/A | 298,000,000,000 | 365 | 816,438,356 | 816,438.4 |
| Bitcoin | 1,203.3 | 94,074,364 | 113,200,000,000 | 365 | 310,136,986 | 310,137.0 |
| Ethereum Pre-Merge | 220.1 | 427,098,308 | 94,000,000,000 | 365 | 257,534,247 | 257,534.2 |
| U.S. Data Center Industry | N/A | N/A | 78,956,800,000 | 365 | 216,320,000 | 216,320.0 |
| Ethereum Post-Merge | 22.0 | 427,098,308 | 9,400,000,000 | 365 | 25,753,425 | 25,753.4 |
| Dogecoin | 291.1 | 10,732,871 | 3,124,338,748 | 365 | 8,559,832 | 8,559.8 |
| Visa | 0.0008 | 232,500,000,000 | 186,000,000 | 365 | 509,589 | 509.6 |
| Mastercard | 0.0008 | 108,400,000,000 | 86,720,000 | 365 | 237,589 | 237.6 |
| Solana | 0.003 | 608,335,036 | 1,967,930 | 365 | 5,392 | 5.4 |
| XRP | 0.0013 | 502,093,240 | 628,733 | 365 | 1,723 | 1.7 |
| Cardano | 0.02 | 36,930,607 | 598,755 | 365 | 1,640 | 1.6 |
| Algorand | 0.0002 | 2,120,323,540 | 512,671 | 365 | 1,405 | 1.4 |
| Stellar lumens | 0.00012 | 2,107,810,321 | 261,435 | 365 | 716 | 0.7 |
| Polkadot | 0.00002 | 4,227,392,683 | 70,237 | 365 | 192 | 0.2 |
| VISA Factsheet; Mastercard - CB Insights Research | | | | | | |

| WATT CONVERSIONS | Terawatts | Gigawatts | Megawatts | Kilowatts | Watts |
|---------------------|-----------|-----------|-----------|---------------|-------------------|
| | 1 | 1,000 | 1,000,000 | 1,000,000,000 | 1,000,000,000,000 |

Sources: University of Cambridge: Cambridge Center for Alternative Finance; University of California, Berkely; Nasdaq Research; XRPL Carbon Calculator; AKCP; Crypto Carbon Rating Institute; Ethereum Foundation; The White House 2022 Crypto-Assets and Climate Report; CB Insights; Messari; Solana and Polkadot daily transaction count not available on Messari.