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Vault Digital Funds

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Fidelity Digital Assets
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Digital assets at Fidelity

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1999 — 

Fidelity Center for Applied Technology (FCAT) is established to research and explore emerging technologies and drive innovation across Fidelity.

2014 — FCAT began mining bitcoin and holding bitcoin proprietarily.

2015 — 

Fidelity Charitable began accepting bitcoin contributions from donors.

2018 — 

Fidelity Digital Assets℠ launched and became the first traditional financial services firm to onboard and custody an institutional asset manager's bitcoin.

2020 — Added a digital asset management arm and entered the digital asset financing space by adding collateral agent capabilities.

We envision a future where all types of assets are issued natively on blockchains or represented in tokenized format.

This will have profound implications for the future of finance:

Several new asset classes will emerge

Illiquid assets will become liquid and broadly accessible

Transaction costs for all assets will decrease

Investing will become increasingly automated

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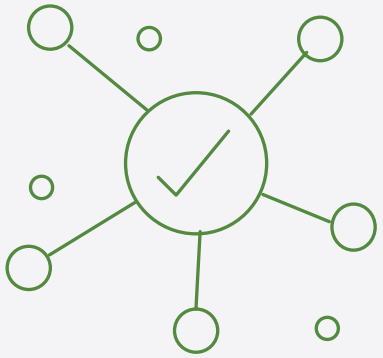
What is Bitcoin?



Bitcoin (the network)

Software code that acts as a protocol and creates a payment system

bitcoin (the token or asset)

Digital tokens that are native to the network and can be treated as a scarce digital asset or money

Bitcoin the Network (Big “B”)

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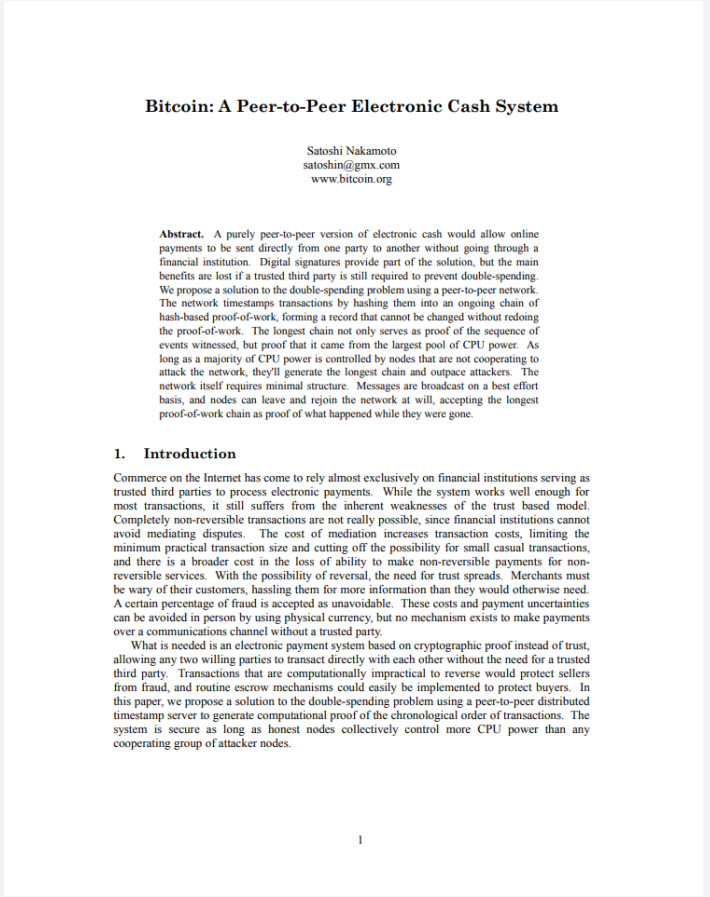
Bitcoin the network is just code running on many computers

- Bitcoin started as just an idea
  - > The idea was written up in a whitepaper published online October 2008
  - > The whitepaper proposed a solution to a fundamental problem inherent to electronic payments
  - > There were many attempts prior to bitcoin to solve this problem
- The idea was tested and built with software code
  - > The code is open-source: anyone can see it, nobody owns it
- That code is now operated on millions of machines, all connected
  - > The machines running the code make up a decentralized network
  - > The code is a kind of protocol that governs how the network operates
  - > This decentralized network operates like a payment network



Bitcoin: A Peer-to-Peer Electronic Cash System

Satoshi Nakamoto
satoshin@gmx.com
www.bitcoin.org

Abstract. A purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution. Digital signatures provide part of the solution, but the main benefits are lost if a trusted third party is still required to prevent double-spending. We propose a solution to the double-spending problem using a peer-to-peer network. The network timestamps transactions by hashing them into an ongoing chain of hash-based proof-of-work, forming a record that cannot be changed without redoing the proof-of-work. The longest chain not only serves as proof of the sequence of events witnessed, but proof that it came from the largest pool of CPU power. As long as a majority of CPU power is controlled by nodes that are not cooperating to attack the network, they'll generate the longest chain and outpace attackers. The network itself requires minimal structure. Messages are broadcast on a best effort basis, and nodes can leave and rejoin the network at will, accepting the longest proof-of-work chain as proof of what happened while they were gone.

1. Introduction

Commerce on the Internet has come to rely almost exclusively on financial institutions serving as trusted third parties to process electronic payments. While the system works well enough for most transactions, it still suffers from the inherent weaknesses of the trust based model. Completely non-reversible transactions are not really possible, since financial institutions cannot avoid mediating disputes. The cost of mediation increases transaction costs, limiting the minimum practical transaction size and cutting off the possibility for small casual transactions, and there is a broader cost in the loss of ability to make non-reversible payments for non-reversible services. With the possibility of reversal, the need for trust spreads. Merchants must be wary of their customers, hassling them for more information than they would otherwise need. A certain percentage of fraud is accepted as unavoidable. These costs and payment uncertainties can be avoided in person by using physical currency, but no mechanism exists to make payments over a communications channel without a trusted party.

What is needed is an electronic payment system based on cryptographic proof instead of trust, allowing any two willing parties to transact directly with each other without the need for a trusted third party. Transactions that are computationally impractical to reverse would protect sellers from fraud, and routine escrow mechanisms could easily be implemented to protect buyers. In this paper, we propose a solution to the double-spending problem using a peer-to-peer distributed timestamp server to generate computational proof of the chronological order of transactions. The system is secure as long as honest nodes collectively control more CPU power than any cooperating group of attacker nodes.

1

Bitcoin the Payment Network vs. Traditional Payment System

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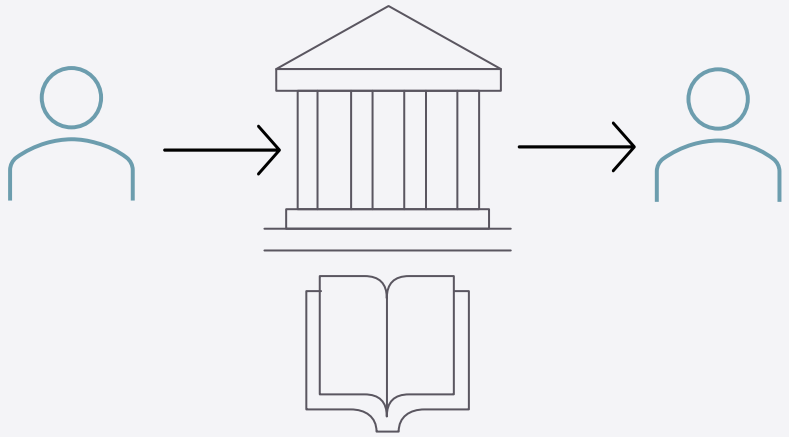
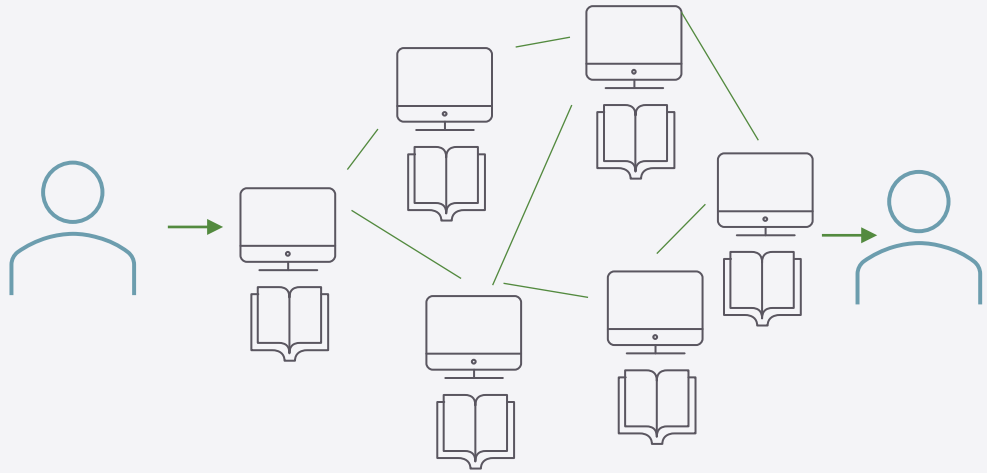
TRADITIONAL PAYMENT SYSTEM

- Centralized
  - > Central ledger maintained by an intermediary
  - > Very efficient (if you trust the intermediary)
  - > Can be expensive
  - > Fraud is unavoidable
  - > Closed system; can be censored



BITCOIN PAYMENT SYSTEM

- Decentralized
  - > Distributed ledger maintained by the entire network
  - > No need to trust an intermediary
  - > Transactions are verifiable, secure, irreversible
  - > Anyone can send any payment, to anyone in the world, at any time



DESIRABLE PROPERTIES OF MONEY


Durable


Divisible


Fungible


Portable


Verifiable

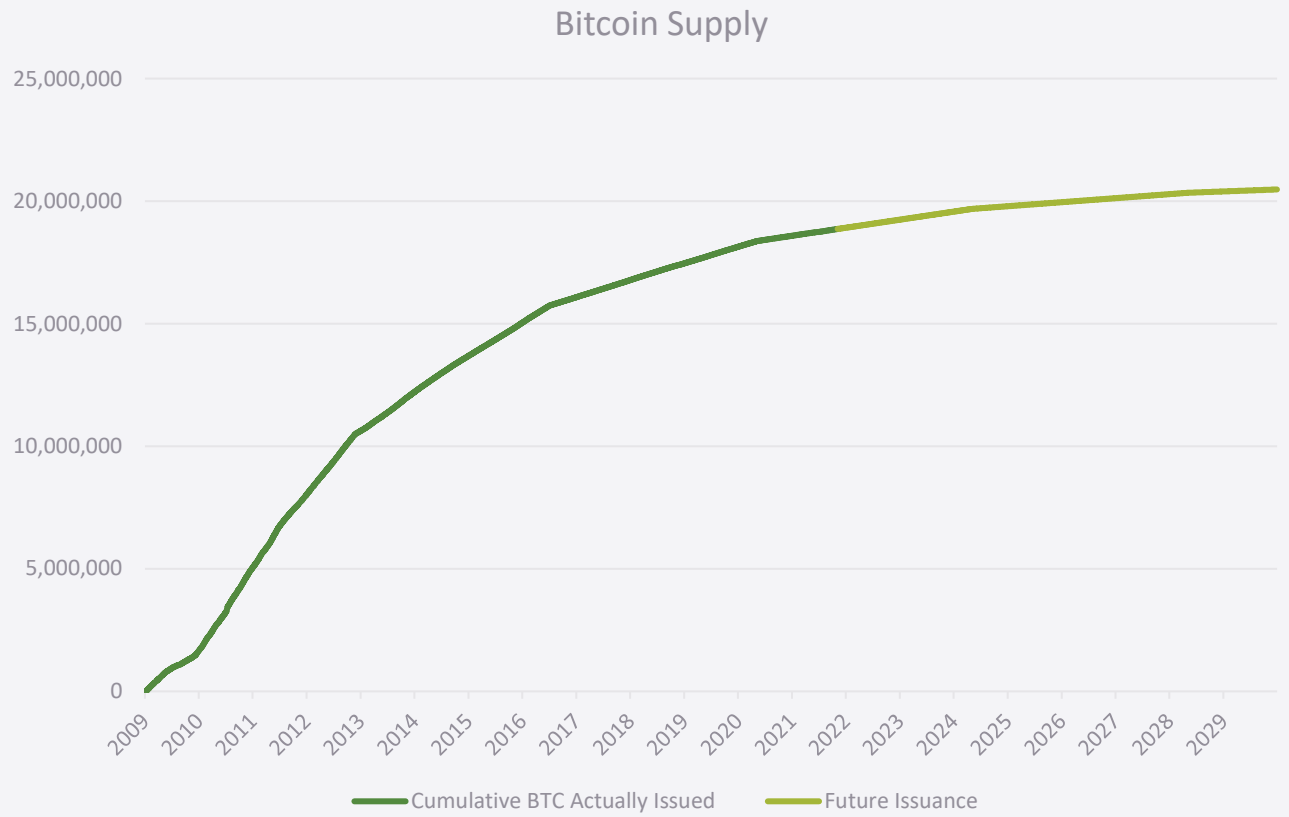

Scarce

BITCOIN VS. U.S. DOLLAR (FIAT CURRENCY)

- Similarities
  - > Easily send and receive it
  - > Can be used for purchases
  - > Can trade it, convertible to other currencies
  - > Fluctuates vs. other currencies
- Differences
  - > Bitcoin is not backed, controlled, or owned by any government, central bank or corporation
  - > No single person or institution controls bitcoin
  - > Bitcoin has a preprogrammed monetary policy

Preprogrammed Monetary Inflation Schedule

- Miners receive newly minted tokens
  - > Acts as a reward/incentive to help secure the network
- Token release schedule is hard coded
  - > New bitcoin minted approximately every 10 minutes
  - > Rewards started out at 50 bitcoin every ten minutes, but gets cut in half every four years
  - > Currently only 6.25 bitcoin are created every 10 minutes
    - > Or ~1.8% annualized inflation rate



Data Source: Coin Metrics and Fidelity Digital Assets Calculations as of 11/07/21.

"Bitcoin can be best understood as
distributed software
that allows for transfer of value
using a currency
protected from unexpected inflation
without relying on trusted third parties."

SAIFEDEAN AMMOUS, *THE BITCOIN STANDARD*

Bitcoin and Digital Asset Narratives

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Narrative	Description
Digital gold	This is the view that assets like bitcoin best serves the purpose of **storing value** giving its **fixed scarcity**, unforgeability, portability and divisibility, like gold.
Portfolio diversifier	This is the view that refers to bitcoin and other digital assets as an **uncorrelated asset with distinct return drivers** vs. traditional assets over long time horizons, making it a **novel portfolio optimization tool**.
Venture capital bet	This is the view that bitcoin and other digital assets are like **early-stage startups** that have the potential to **disrupt** existing markets and **create** new markets.
Tokenization	This is the view that **blockchain issuance** of digital and non-digitally native assets can **expand access** across borders and **help reduce costs** and foster **efficiencies**.

What does Bitcoin and a platypus have in common?

- Is bitcoin:
  - > A platform?
  - > A payment network?
  - > Digital gold?
  - > A commodity?
  - > A Currency?

Image Source: Illustration by Frederick Polydore Nodder, public domain image

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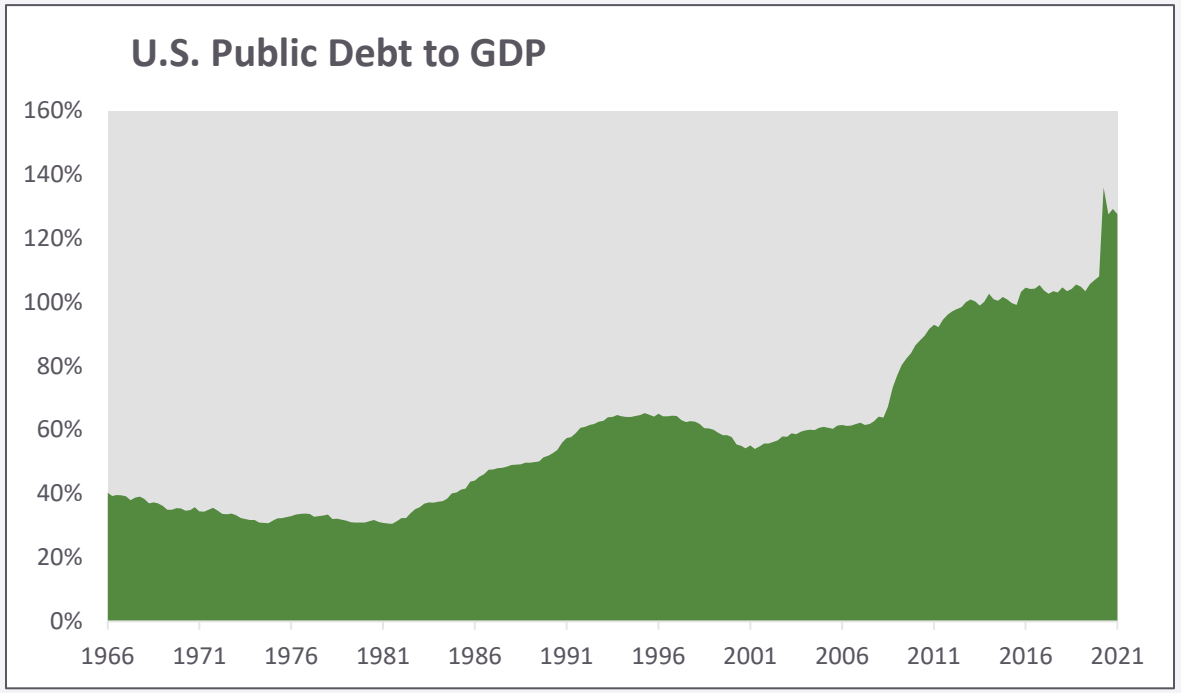
Bitcoin's Role in Modern Portfolios

Traditional Portfolios – Macro Backdrop

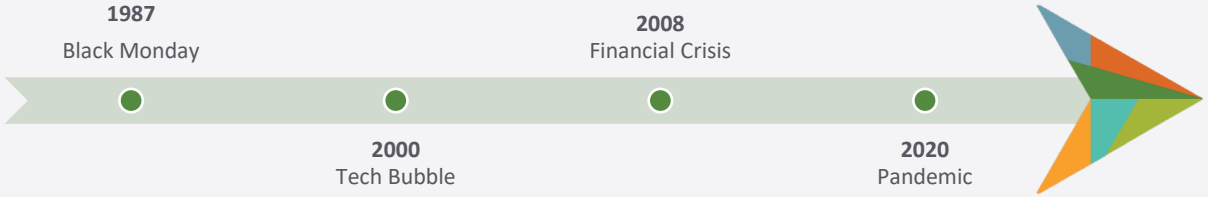


Financial repression appears a most likely candidate for long-term normalization of the system. Repressing returns of financial assets, particularly fixed income, becomes a tool of taxation for the state.

Global Sovereign Debt to GDP at All-time Highs

- U.S. public debt to GDP is nearly 130%.
- This excludes off-balance sheet liabilities associated with entitlement programs like Social Security and Medicare (estimated to be at least 2 times as large).

Leveraged Systems Become More Fragile



Forward Outlook

- Normalization revolves around what happens to these global sovereign balance sheets. Options include:
  - Real GDP Growth
  - Debt Default & Restructuring
  - Financial Repression (Negative Real Interest Rates)

Source: Federal Reserve Bank of St. Louis. Date Accessed: 08/16/2021.

Bitcoin's Investment Thesis

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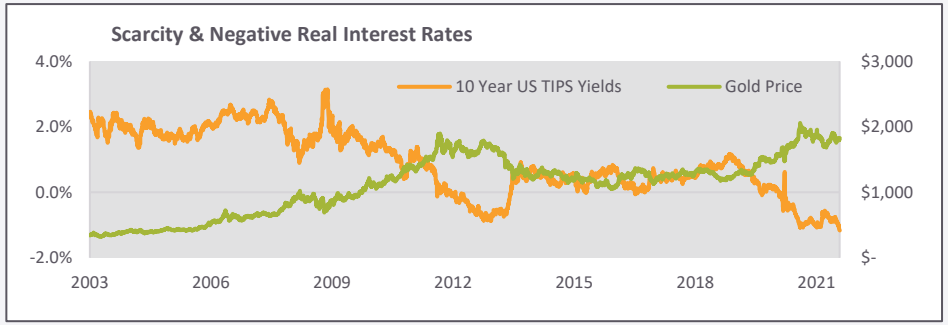
1. Inflation Hedge

- 21 million token hard supply cap has given bitcoin a “digital gold” narrative
- Bitcoin has shown an ability to provide a hedge against monetary debasement and broad asset price inflation
- Scarcity tends to perform well during periods of financial repression



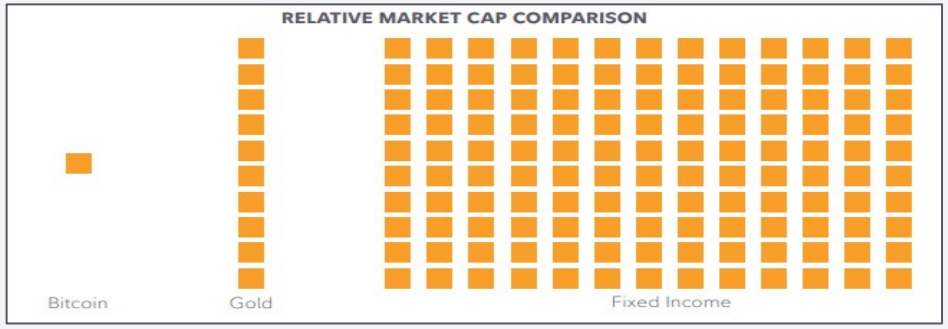
2. Portfolio Diversifier

- Correlations between bitcoin and traditional assets has remained low throughout historical data
- Like gold, bitcoin is still susceptible to correlation during large, risk-off events
- Over the long-term, the drivers of bitcoin’s ultimate success or failure are driven by truly alternative outcomes

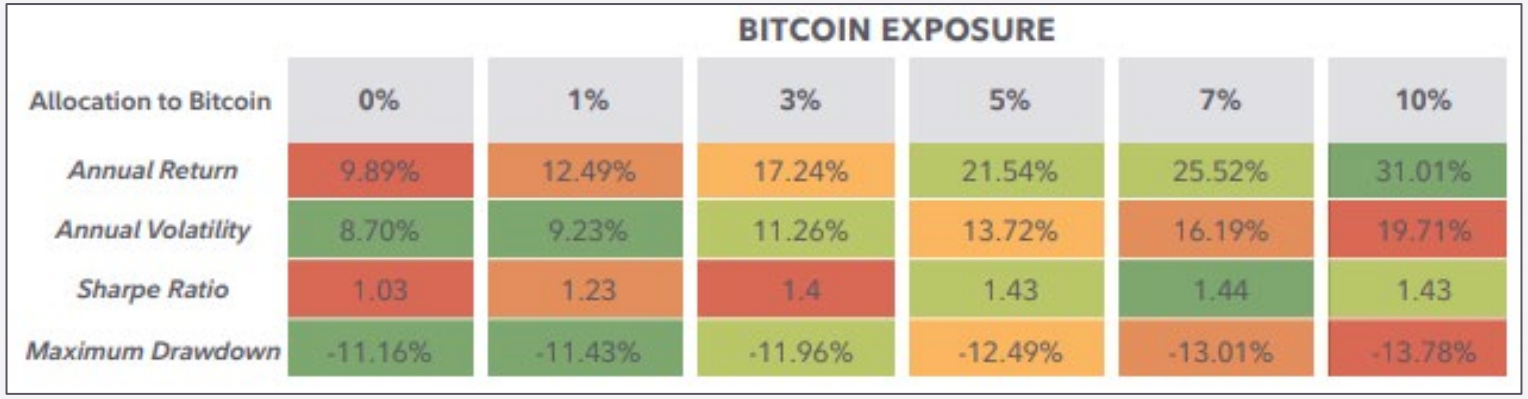
	XBT	SPY	QQQ	IEMG	AGG	GLD
XBT	1	0.26	0.21	.018	0.07	0.04
SPY	0.26	1	0.92	0.73	-0.05	0.01
QQQ	0.21	0.92	1	0.68	0.03	0.01
IEMG	0.18	0.73	0.68	1	0.11	0.22
AGG	0.07	-0.05	0.03	0.11	1	0.53
GLD	0.04	-0.01	-0.01	0.22	0.53	1

3. Venture-like Return Profile

- Bitcoin’s TAM is massive. Today, bitcoin has market cap of around $1 trillion vs other store of value assets like gold (~$10 trillion) and fixed income (~$130 trillion)
- The skewed return profile and TAM give bitcoin the ability to have meaningfully positive impacts on returns via small positions



Position Sizing Considerations



	BITCOIN EXPOSURE					
Allocation to Bitcoin	0%	1%	3%	5%	7%	10%
Annual Return	9.89%	12.49%	17.24%	21.54%	25.52%	31.01%
Annual Volatility	8.70%	9.23%	11.26%	13.72%	16.19%	19.71%
Sharpe Ratio	1.03	1.23	1.4	1.43	1.44	1.43
Maximum Drawdown	-11.16%	-11.43%	-11.96%	-12.49%	-13.01%	-13.78%

Small Positions in Traditional Portfolios

- The first 50-100 basis points has historically added the most efficient increase in risk-adjusted returns to an otherwise traditional portfolio.
- Portfolios with zero exposure to bitcoin have historically had a far lower Sharpe than portfolios with small or large positions in bitcoin.
- Allocations beyond 1-3% of exposure begin to largely make tradeoffs between risk and return, rather than making increases in portfolio efficiency.

Data Source: Bloomberg. Date Accessed: 07/11/2021.Period Studied: 01/01/2015-06/30/2021. Stocks are represented using the Standard & Poor's 500 Index. Bonds are represented using the Bloomberg Barclays Aggregate Index. Bitcoin is represented using the Fidelity Bitcoin Index. Portfolios rebalanced annually.

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Addressing Common Questions

“Bitcoin is too volatile”

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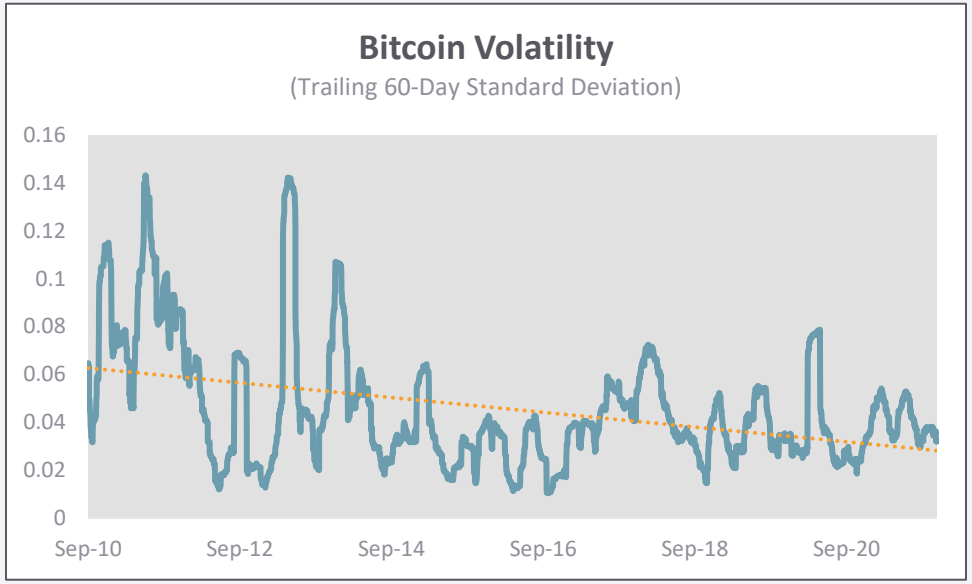
Volatility Has Decreased as Liquidity Increases & Overall Risk Decreases

- While still volatile, the extremes have reduced overtime and major news events continue to have less impact over time.
- Only ~2% of the global population holds bitcoin; it therefore continues to undergo a monetization/price discovery process.
- Volatility will likely continue to dimmish as liquidity deepens and institutions continue to recognize the potential of digital assets.



Position Sizing Reduces the Impact of this Volatility

- Small allocations (1-3%) have made considerable impacts on returns while only slightly increasing overall portfolio volatility.
- Risk-adjusted returns have historically improved dramatically from a small allocation to bitcoin.
- It would be irrational to expect returns without volatility, as Bitcoin grows into its TAM, both risk (measured as volatility) and forward return expectations are likely to come down.

Data Source: Coin Metrics. Date Accessed: 11/24/2021.Period Studied: 09/01/2010-11/24/2021.

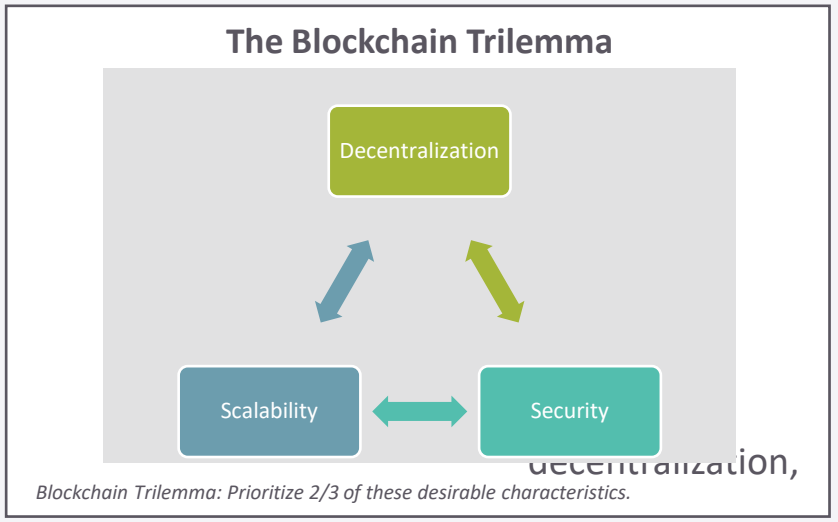
“Bitcoin can be copied”

Bitcoin is Entirely Open Source & Transparent

- Solving for true digital scarcity (Byzantine Generals Problem) was a step forward in technology akin to the discovery of electricity.
- Network effects have driven adoption around the Bitcoin protocol and reinforce its core principles of decentralization and security.

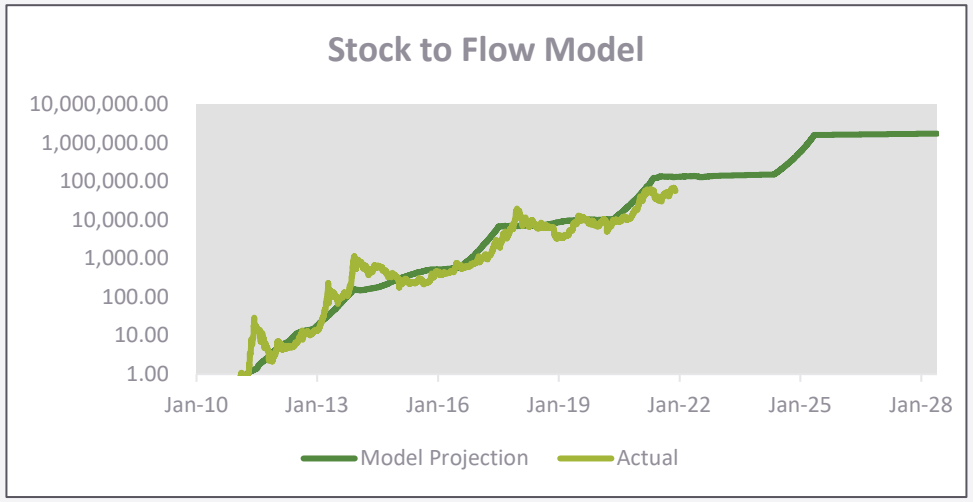
Bitcoin’s Explicit Tradeoffs Make it Special

- Base layer scalability is traded off in order to maximize overall security and user rights.
  - **Fair Launch**: A pseudonymous person who took no credit, wealth or advantage in the creation of the network.
  - **Security**: Bitcoin’s proof of work consensus mechanism holds > 97% of all cryptocurrency hashrate, making it arguably the most secure software protocol on the planet.
  - **Decentralization**: Bitcoin’s base code simplicity allows for everyday people to verify the entire chain’s history (< $200 worth of equipment). Today, there is an estimated > 12,000 individual nodes verifying Bitcoin’s history.
  - **User Rights**: Maximizing security and decentralization reinforces the network’s ruleset, giving all users assurance that the rules will be enforced equally upon all parties and not changed.
- Since Bitcoin came first, established a network effect and maximizes the characteristics that drive its monetary properties, it is unlikely or highly improbable to lose the role of most decentralized, scarce digital asset.



Blockchain Trilemma: Prioritize 2/3 of these desirable characteristics.

“Bitcoin can’t be valued & has no fundamentals”

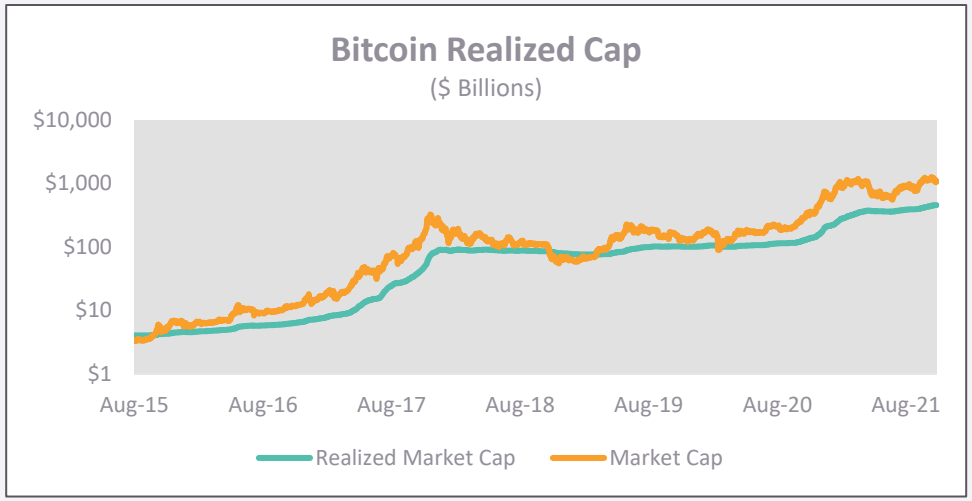


Traditional Style Valuation Models: Supply & Demand

- **Stock to Flow**: Valuing a scarce asset based on its current outstanding stock relative to new annualized flow.
- **Metcalfe’s Law**: Technology can be valued as a function of its userbase and growing network effects.
- **Relative Valuation**: Considering the asset as a relative percentage of its total addressable market (gold/store of value assets).

New Era of Financial Models: On-Chain Metrics

- Digital assets have transparent ledgers where data and useful insights can be gleaned.
- On-chain movement of assets can be recorded in real time.
- Identifying directional trends in exchange balances, average holding period, address growth and other metrics can help display signs of overall network health.



Data Source: Coin Metrics. Date Accessed: 11/24/2021.

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Off Balance Sheet Federal Liabilities

The Liquidation of Government Debt

Bitcoin Market Capitalization

Gold Market Capitalization

Bond Market Size

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