GALAXY
FUND MANAGEMENT

DIGITAL DIVERSIFICATION

Bitcoin's Role in the Modern Portfolio

January 2020

Bitcoin
is here to stay.

Find out why.

Bitcoin: A New Asset

Bitcoin has become a force of innovation since its invention in the aftermath of the 2008 financial crisis. The utility of its underlying blockchain technology has driven the value of the native digital asset that rides on top of it—bitcoin with a lowercase "b"—to be the world's best performing investment of the last decade.[1]

Originally conceived as a peer-to-peer electronic cash for the Internet, bitcoin has become a next generation store of value, resistant to political censorship or interference and governed by the mathematical principles of its open source code. It is built on a long history of technological advancements in computer science, cryptography, and digital scarcity, and its disinflationary nature is designed to facilitate trust-minimized, peer-to-peer transactions without a centralized intermediary in a highly secure and transparent way.

Bitcoin can best be thought of as distributed software that allows for the transfer of value via its native digital asset, bitcoin, without relying on trusted third parties. Its store of value characteristics are forged from its public, predictable, and unchangeable monetary policy that allows protection from unexpected inflation. Bitcoin has created a new asset class that may become the biggest technological development since the Internet. As its open-source software evolves, bitcoin will continue to differentiate itself further from traditional asset classes.

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Immutability

Hard-coded software designs user rules

All transactions between users are permanently recorded

Auditable transaction verification and history

Non-Sovereign Status

No single point of failure or control

Supply issuance resistant to macro or government influence

Democratized digital money

Limited Supply

Bitcoin offers one of the only verifiably scarce, immutable, and capped supply assets in the world

Only 21 million bitcoin will ever be issued

Security

Cryptographically secured and validated transactions

Security lies in the asymmetry of the costs of performing the "proof-of-work"

The Bitcoin blockchain has never been hacked [2]

[1] https://www.bloomberg.com/news/articles/2019-12-31/bitcoin-s-9-000-000-rise-this-decade-leaves-the-skeptics-aghast [2] While custodians and exchanges that hold bitcoin have been hacked, the Bitcoin blockchain itself has never been hacked. Source: Galaxy Digital Research, Federal Reserve Bank of St. Louis, Bitcoin.

Digital Gold for a Digital World

Historically, society has sought the time-tested reliability of gold as a safe, durable store of value. Investors look to gold in times of market stress as a "flight to safety" to preserve wealth and protect against inflation in the financial system. Gold has also played a central role in physical trade for thousands of years, but we now live in a digital world.

Bitcoin shares many of the same attractive properties of gold that have made it a great store of value for centuries. Both gold and bitcoin are borderless and have no centralized power or government that controls their supply. Both are globally recognized, easily verifiable, and have limited supplies.

Yet, bitcoin has modernized and improved properties that position it as an attractive alternative to gold. Unlike gold, bitcoin is easily divisible into smaller units. While gold requires large and expensive storage facilities and is extremely difficult to physically transport, bitcoin does not require high storage costs and is weightless. Bitcoin can travel across borders in the same frictionless way that information is shared across the Internet.

Bitcoin provides global investors a digital store of value asset for a digital world.

	Bitcoin	Gold
Limited Supply	✓	✓
Borderless	✓	✓
Decentralized	✓	✓
Easily Verifiable	✓	✓
Fast Value Transfer	✓	
Weightless	✓	
Protection Against Counterfeiting	✓	
Easily Divisible	✓	
Low Cost Storage and Transfer	✓	
Censorship Resistant	✓	

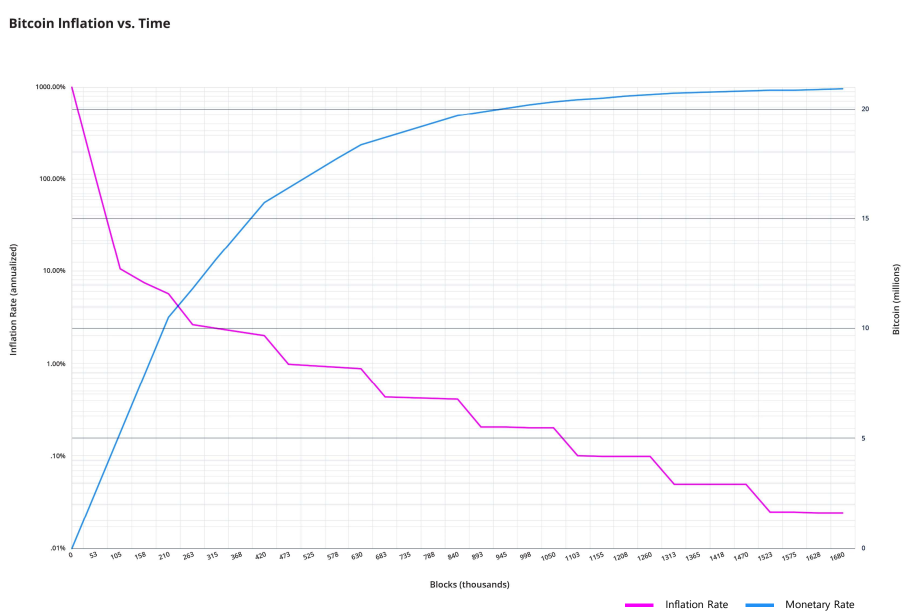
Fixed Supply

Bitcoin is one of the only verifiably scarce, fixed supply assets in the world. Bitcoin's underlying code controls how much new bitcoin is created and limits the maximum amount of bitcoin that will ever exist to 21 million. Bitcoin has a price-inelastic supply, meaning that a change in price cannot change its supply issuance. Said differently, bitcoin's supply is transparent and unchangeable; it is strictly bound and algorithmically hard-coded. An increase in the value of bitcoin does not affect its supply, and does not affect bitcoin's issuance schedule.

As of today, just over 18 million of that total supply has been issued as block rewards to the miners securing and validating Bitcoin's network. Approximately every four years, the supply of bitcoin issued as mining rewards gets cut in half until eventually no more supply will be issued. The next bitcoin supply reduction is set to occur in May 2020, when the supply issuance will be reduced from 12.5 bitcoin per block to 6.25 bitcoin per block. This "block reward" for miners will continue to be cut on a fixed schedule until it approaches zero around 2140.

Unlike most global currencies or commodities, bitcoin's transparent and immutable fixed supply properties make it a truly unique investable asset. Investors favor the fact that bitcoin's supply cannot be expanded, thereby allowing its inflation schedule to be predictable.

Bitcoin is one of the only verifiably scarce, fixed supply assets in the world.



Source: Galaxy Digital Research: Bitcoin & Macroeconomic Uncertainty, August 18, 2019.

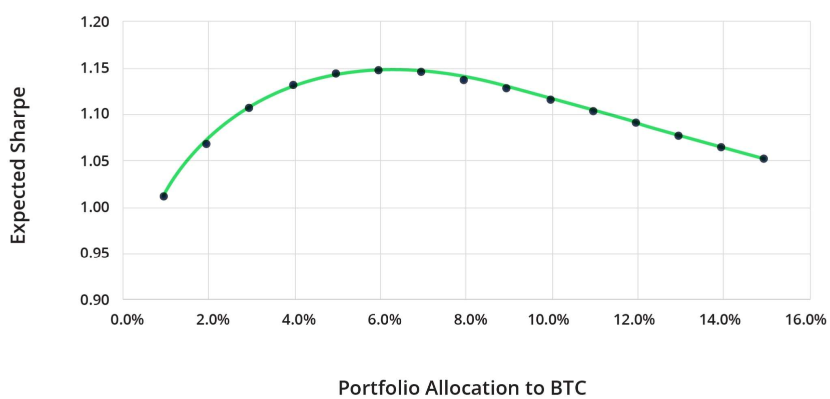
Modern Portfolio Theory in the Digital Age

Modern portfolio theory (MPT) is a trusted analysis often used by investors to model scenarios of optimal portfolio allocations to various assets. Investors assessing the role of bitcoin in their portfolios are encouraged to utilize the same MPT approach for a quantitative-based analysis of bitcoin.

MPT demonstrates that bitcoin's history of positive returns and uncorrelated nature make it an attractive addition to traditional portfolios. Despite its volatility, adding a small portfolio allocation to bitcoin generally increases the overall expected return and improves the portfolio's expected risk-adjusted returns. It also potentially diversifies some of the systemic risk that exists in modern portfolios.

Most modern portfolios present a fair degree of inherent systemic risk in the financial system. Adding bitcoin to an investment portfolio diversifies away some of this systemic risk and offers additional portfolio benefits. Our study shows that a hypothetical portfolio's Sharpe ratio is optimized somewhere near a 6% allocation to bitcoin. However, the strongest marginal improvement to a portfolio's Sharpe ratio occurs in the 0.5% to 2.5% range. This demonstrates that even a small percentage allocation to bitcoin in a portfolio can have a major impact.

A small allocation to bitcoin increases expected portfolio returns and optimizes Sharpe.



Source: Galaxy Digital Research: Modern Portfolio Theory and Bitcoin, November 2019.

A Macro Hedge Against Global Uncertainty

Historically, bitcoin's correlation among established macro assets typically hovers within ±0.25 around a zero correlation. Bitcoin maintains its uncorrelated nature during periods of significant market moves better than gold, fixed income, and the Yen.

Many believe that bitcoin can be used as a hedge against macroeconomic uncertainty. With global debt hitting record peaks, bitcoin can serve as a hedge against weak or harmful government institutions. This is especially true of many developing market economies prone to high inflation (e.g., Argentina, Venezuela). Bitcoin offers anyone with Internet access the ability to transact and store wealth in a vehicle that operates separately and distinctively from local fiscal and monetary policies.

Global markets will continue to be impacted by increasing uncertainty due to significant shifts in trade, tariff, and tax policies, as well as monetary and fiscal policies at the national level. Financial cycles are becoming increasingly severe and further quantitative easing threatens to swell central bank balance sheets, devaluing investors' purchasing power in the process. Bitcoin offers investors a potential hedge against this global uncertainty.

In times of stress, when it matters, bitcoin has been uncorrelated. Over its 11 year history, bitcoin has demonstrated very low or even slightly negative correlation to most major global asset classes including the S&P 500, Euro Stoxx 600, Nikkei 225, MSCI Index, US Agg Bond Index, Crude WTI, Gold, the DXY, EUR, and other emerging market currencies.

Bitcoin may serve as a global hedge on the existing financial system.

	BTC	S&P 500	Eur Stoxx 600	Nikkei 225	MSCI EM Index	US Agg	Pan-Euro Agg	Asian-Pac Agg	EM Agg	DXY	EUR	JPY	GBP	EM CCY	Gold	Crude WTI
BTC	1.00															
S&P 500	-0.15	1.00														
Eur Stoxx 600	-0.19	0.72	1.00													
Nikkei 225	-0.15	0.67	0.68	1.00												
MSCI EM Index	-0.14	0.65	0.50	0.38	1.00											
US Agg	0.00	-0.09	0.03	-0.36	0.17	1.00										
Pan-Euro Agg	-0.11	0.17	-0.03	-0.22	0.50	0.33	1.00									
Asian-Pac Agg	-0.05	-0.24	-0.32	-0.57	-0.06	0.61	0.29	1.00								
EM Agg	-0.16	0.43	0.49	0.12	0.72	0.51	0.48	0.20	1.00							
DXY	-0.11	0.72	0.77	0.48	0.68	0.06	0.42	-0.25	0.60	1.00						
EUR	0.09	-0.15	0.12	0.14	-0.47	-0.01	-0.90	-0.07	-0.32	-0.41	1.00					
JPY	0.04	0.22	0.28	0.63	-0.22	-0.46	-0.45	-0.53	-0.34	-0.02	0.39	1.00				
GBP	-0.11	-0.43	-0.25	-0.32	-0.41	0.29	-0.41	0.28	-0.17	-0.56	0.53	-0.05	1.00			
EM CCY	-0.15	0.39	0.26	0.07	0.82	0.16	0.65	0.12	0.76	0.52	-0.63	-0.37	-0.38	1.00		
Gold	0.03	-0.15	-0.15	-0.49	0.25	0.53	0.39	0.57	0.38	0.03	-0.27	-0.72	0.06	0.35	1.00	
Crude WTI	-0.08	0.33	0.23	0.19	0.38	-0.21	0.23	-0.19	0.34	0.38	-0.34	-0.08	-0.44	0.37	0.04	1.00

Source: Galaxy Digital Research: Bitcoin & Macroeconomic Uncertainty, August 18, 2019.

Early Lifecycle Growth

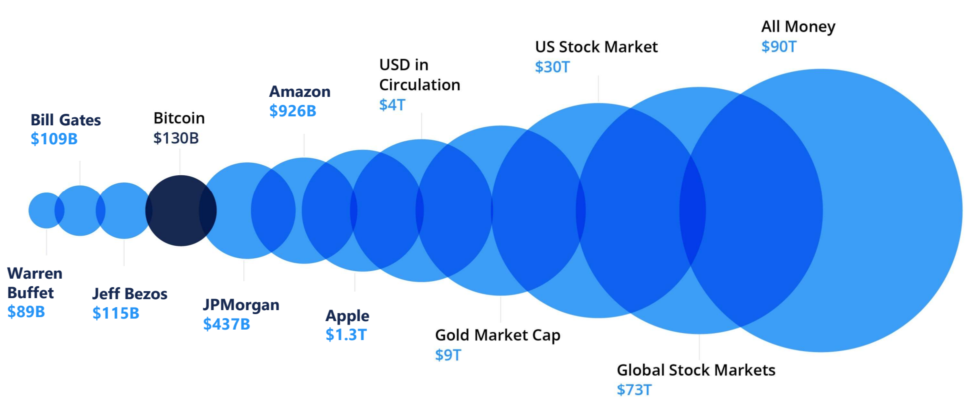
Bitcoin may seem like it has quickly exploded onto the scene, but it has steadily and consistently been making gains in adoption, usage, and awareness since its inception over 11 years ago. Its growth has been quite impressive and has provided investors with stellar absolute returns, far exceeding those of any other asset class in a similar time period.

Yet, bitcoin still has tremendous room to expand compared to other global markets. Bitcoin's current market cap stands at $130B as of December 31, 2019. That is only slightly higher than the individual wealth of Jeff Bezos ($115B), Bill Gates ($109B), or Warren Buffet ($89B) and far smaller than individual companies like Apple ($1.3T) or Amazon ($926B).[1]

Further still, when compared to the size of the gold market ($9T), US stock market ($30T) or all global money ($90T), bitcoin has tremendous upside growth potential.[2] The total value of gold is 70x the size of bitcoin and global stock markets are nearly 560x the size of bitcoin.

In 2019, bitcoin outperformed world stock market indexes, generating a +92.9% return.[3] In comparison, the S&P 500 generated +28.8%, the Nasdaq 100 +39.5%, the FTSE Europe 100 +11.2%, and the MSCI China +21.8%.[4]

Bitcoin's total market cap continues to grow, but still has tremendous room to expand compared to other global markets.



Sources: [1] Google Finance [2] http://money.visualcapitalist.com/worlds-money-markets-one-visualization-2017/ , https://tradingeconomics.com/united-states/money-supply-m1; [3] CoinMarketCap [4] Google Finance, Yahoo Finance.

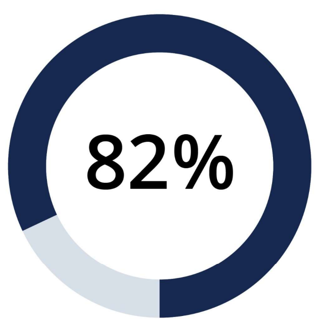
Institutional Adoption

Due to its open source ethos, bitcoin has traveled an unconventional growth path. Instead of being cultivated in the boardrooms or trading floors of large financial institutions like most transformative financial innovations, bitcoin first captured the hearts and minds of many retail, HNW, and family office investors. Institutions took note and have started to embrace bitcoin as a part of their investment strategy given the transformative investment opportunity it presents.

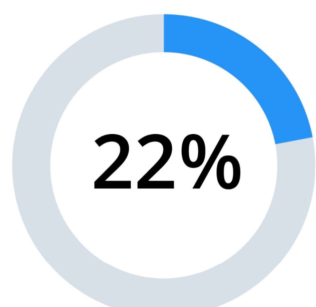
Billions of dollars of infrastructure investments have been made in the last few years to support bitcoin's robust ecosystem and enable institutional investors to have the tools and opportunity to invest, trade, and instantly transact with billions of dollars in daily liquidity. Progress on this front includes regulated custody, physically settled futures contracts, and regulated options contracts.

From Goldman Sachs to Fidelity, to IBM and the NYSE/ICE, major financial institutions have made and continue to make sizeable investments in the industry and verticals of bitcoin's value chain. This institutionalization has enabled the growth of secure, regulatory compliant, institutional caliber financial products and services, further facilitating the flow of global investment into the space.

For sophisticated institutional investors, bitcoin can no longer be ignored.



of the Fortune 100 have explored blockchain[1]



of institutional investors already own digital assets[2]

Sources: [1] https://www.cryptotapas.com/82-of-the-fortune-100-have-explored-blockchain-here-are-the-details/ [2] https://www.marketwatch.com/story/more-than-20-of-institutional-investors-already-own-digital-assets-fidelity-survey-finds-2019-05-02

The Future is Bright

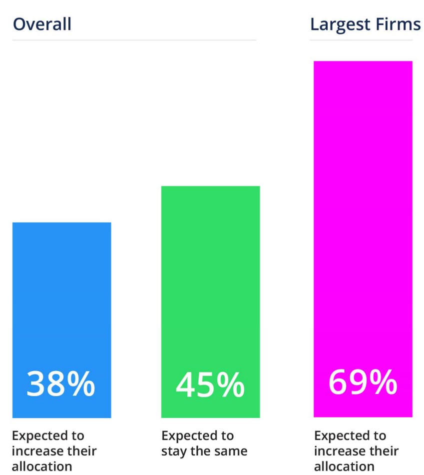
In just over a decade, bitcoin has transformed from a relatively obscure innovation into a $130 billion, globally recognizable institutional asset with room to grow. If bitcoin were an asset class, it would be the best performing one over a one-, three-, and ten-year period.[1] For sophisticated investors, it can no longer be ignored.

Additionally, the institutionalization bitcoin experienced in 2019 is expected to accelerate in 2020. Bakkt, a subsidiary of ICE, launched in September 2019 to enable institutional, merchant, and consumer access to digital assets, with bitcoin as its primary focus. Demand for bitcoin-only private funds is expected to increase as a result of delayed approval of an official bitcoin ETF by the SEC.

Investors can observe these fundamental adoption trends taking hold by the growing number of people interacting with bitcoin. The number of unique bitcoin wallets created has already doubled over the last two years, from 21 million wallets at the beginning of 2018 to nearly 45 million today. Additionally, the next bitcoin supply reduction is set to occur in May 2020 when the supply issuance will be reduced from 12.5 bitcoin per block to 6.25 bitcoin per block. Thus, as mainstream awareness and participation grows, this increased demand combined with programmatic fixed supply contraction is expected to create a strong tailwind for bitcoin as an institutional asset.

More and more people are discovering and investing in bitcoin every day. Open to all, bitcoin's ability to settle immense value across borders, 24/7, is unprecedented in the history of money. Bitcoin is the world's first global asset that harnesses the power of computers—and humankind's innate need to innovate—to enable a worldwide decentralized store of value. 2020 is highly likely to see further increases in bitcoin adoption, innovation, and interest.

A survey of US Asset Managers and asset owners suggests a positive outlook for bitcoin in 2020.[2]



Sources: [1] Galaxy Digital Research [2] https://newsroom.statestreet.com/press-release/corporate/state-street-survey-reveals-bright-future-both-digital-assets-and-semi-trans

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