Opportunities in digital asset ETFs: Blockchain and bitcoin

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What are digital assets and surrounding ecosystems?
Digital assets are blockchain-based, decentralized assets that have evolved from simple cryptocurrencies like bitcoin to a diverse array of products that utilize innovative technology backed by blockchains. They operate on peer-to-peer networks, use decentralized ledgers for information storage, and aim to leverage the security, resilience, and scalability of decentralized networks. These assets range from cryptocurrencies, to tokenized money and investment products that represent real-world assets like stocks, bonds, or real estate. A myriad of supporting financial institutions, technology companies and even manufacturing companies have helped to make innovation and progress in digital assets possible. Digital assets offer a broad spectrum of both direct and indirect investment opportunities through this ecosystem. Altogether, this emerging asset class and its economy is worth nearly US $2 trillion in market capitalization[1], or around half the size of all USD cash in circulation.

What is a blockchain?
A blockchain, in its most basic form, is a decentralized and secure digital ledger system. It records and verifies transactions across a network of computers without relying on a centralized authority. Each transaction is confirmed by numerous computers, then stored in a 'block' that is cryptographically linked to previous transactions, creating a 'chain'. This structure ensures the data is tamper-resistant, as altering any piece of information would compromise the chain's integrity. Originally the foundational technology for cryptocurrencies like bitcoin, blockchain is now employed in various sectors for its transparency, security, and efficiency.

What are cryptocurrencies and bitcoin?
Cryptocurrencies are digital currencies that typically use blockchain for transaction verification and record maintenance instead of a centralized authority. The most common cryptocurrencies include bitcoin and Ethereum. Bitcoin was invented in 2008 amidst the Global Financial Crisis (GFC) as a decentralized alternative to the traditional banking system, differing from fiat currencies, which are backed by a government. Currently, bitcoin is the world's largest and most liquid cryptocurrency, boasting a market capitalization of over US $850 billion, which is approximately 50% of the total digital assets market.[2]

1 Digital Asset Data: 2023 Recap and 2024 Trends, January 2024, https://www.digitalassetresearch.com/digital-asset-data-2023-recap-and-2024-trends/
2 Galaxy, data as of December 31, 2023.

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Figure 1 – Understanding blockchain technology

How does blockchain work for bitcoin?

1. Each transaction - or change in data - is provided to the network and integrated into a packet of data called a "block"

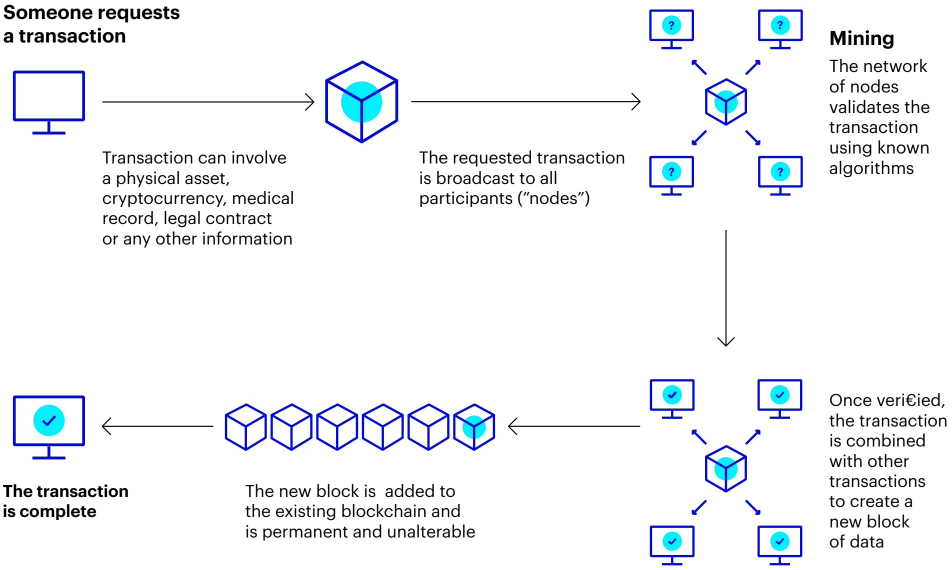
2. Given it is a decentralized database, the various participants need to agree on the current state of data (including any changes to it)

3. Mining - To achieve this, each block undergoes an energy - intensive veri€ication process using a series of cryptographic rules and puzzles

4. Newly veri€ied blocks are broadcast to the network and added to the blockchain

   The "mining" process continually creates new "blocks" in the blockchain with new transaction data, forming a public, "distributed ledger" where each participant has record of every transaction.

A blockchain in motion



A **blockchain** is made up of **blocks** which are made up of veri€ied tansactions. Each block contains around 2,000 transactions and a new block is created roughly every 10 minutes.

Source: Invesco, for illustrative purposes only.

How can I access digital assets?
While new methods to invest in digital assets are always developing, the two main ways include: buying stocks in companies that participate in the digital economy, such as bitcoin mining companies or cryptocurrency exchanges, or investing in cryptocurrencies, like bitcoin.

For investors buying stocks in surrounding blockchain technology, their goal is to participate in the innovative technology advancements of blockchain or the shift to decentralized finance. Decentralized finance (also known as DeFi) describes a system in which financial transactions are made directly between buyers and sellers without the need for banks or other centralized financial institutions. Globally, next year, this emerging sector is forecast to generate US $1.4 trillion in revenue.[3] The strategy aims to capitalize on the transformative impact of blockchain and decentralized ledger on the future of finance, akin to how growth tech stocks represent cutting edge technology in a variety of sectors.

However, getting diversified exposure to digital assets and the companies involved in this industry is challenging as investors need to research and find individual companies that have varying exposures to digital assets. That is where exchange-traded funds (ETFs) come in. ETFs can provide investors with exposure to narrow or broad aspects of the digital asset ecosystem, all through well-known vehicles that are simple and efficient to own and trade.

3 Source: Bloomberg as of January 25, 2024 based on the forecasted revenue of companies in the Alerian Galaxy Global Cryptocurrency-Focused Blockchain Equity, Trusts and ETPs Index.

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Exposure to cryptocurrencies can be accessed in three ways:

1. **Direct investment:** Direct ownership of the cryptocurrency through major crypto exchanges
2. **Indirect exposure via derivatives:** Access cryptocurrency via derivative instruments (e.g. exchange-traded futures) or derivatives-based ETFs
3. **Direct exposure via ETFs:** Access cryptocurrency via an ETF whose shares values are derived from physical bitcoin stored in institutional grade custody

Figure 2 – Comparison of various methods to invest in bitcoin

	Direct Investment	Futures Contract or Futures ETF	Trust Structure	Private Fund	Exchange - Traded Fund on Physical Bitcoin
How it works?	• Buy bitcoin on crypto exchange • Hold in digital wallet	• Cash-settle contracts to receive (or deliver) bitcoin at a specified future time • Invest in shares of an ETF that holds bitcoin futures	• Invest in shares that are secured against physical bitcoin	• Invest in Limited Partner Interests that are secured against physical bitcoin	• Invest in shares that are secured against physical bitcoin
Costs	• Trading costs, can vary from 0.5% to over 1% depending on the exchange • Deposit/withdrawal fees	• Variable transaction costs • Roll costs (depends on cost of financing and implied storage costs)	• Annual fixed fee but typically on the higher end (~2%) with high investment thresholds • On-exchange trading costs to be confirmed	• Annual management fee • Annual operating expenses	• Annual fixed fee • Bid/ask spread of ETFWW
Pros	✓ Direct ownership of bitcoin	✓ Speculate on bitcoin price without ownership ✓ Hedge positions ✓ No need to manage wallets and keys	✓ Exposure to bitcoin price action without ownership ✓ No need to manage wallets and keys	✓ No need to manage private keys or wallets ✓ Minimal deviation from the spot price expected	✓ Easy to invest, trades like shares on major exchanges – flexible entry and exit ✓ No need to manage wallets and keys ✓ Minimal deviation from the spot price expected
Cons	× Risks and complexities with managing wallets and encrypted keys × Some platforms are unregulated and prone to security & hacking risks	× Contracts must be rolled regularly which can lead to significant negative roll costs × Potential deviation from spot prices × No direct ownership of bitcoin	× Often trades at a significant premium or discount to the spot price × Minimal entry/exit flexibility × No direct ownership of bitcoin × Lack of transparency	× Investor eligibility requirements, typically accredited investor × Higher fees × Less frequent liquidity × No direct ownership of bitcoin	× No direct ownership of bitcoin

Source: Invesco, Galaxy Research. For illustrative purposes only.

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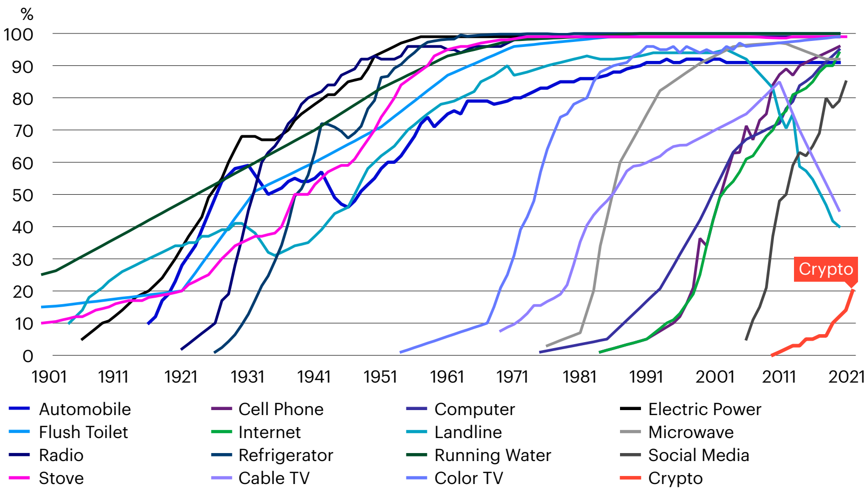
Why use a "physical" ETF for exposure to cryptocurrencies (like bitcoin)?
Investing in cryptocurrencies through exchange traded funds (ETFs) combines the benefits of getting the asset return potential of the cryptocurrency, with the enhanced security and convenience of established financial infrastructure. Exposure via physically backed ETFs offers a simplified approach compared to the complexities and risks associated with directly managing cryptocurrencies like bitcoin in individual wallets, mitigating the potential for permanent access loss.

This approach also avoids downsides often seen with indirect investment methods like derivatives or derivative-based ETFs, especially the extra costs that can occur with fluctuating futures prices and deviation from the spot price.

Physical bitcoin ETFs are fully integrated into the regular trading system, allowing them to be bought and sold just like traditional stocks and ETFs. This integration blends the innovative world of cryptocurrency with the familiar practices of the financial market, offering an attractive investment option for financial institutions.

Why consider cryptocurrencies and the digital assets economy?
Since bitcoin's inception in 2008, the cryptocurrency and digital assets ecosystem has transformed into a multi trillion-dollar economy in just under 15 years. At the same time the adoption of this technology is in its early stages. Beyond transforming payment methods and financial instruments, new use cases leveraging blockchain's secure and trustless nature emerge daily, drawing more users to cryptocurrencies and their underlying technology. Viewing the digital assets economy through the lens of other pivotal technologies from the last decade, it mirrors similar adoption and growth patterns, signaling that digital assets may be on the cusp of mass adoption. Globally, during 2023, the number of cryptocurrency users increased by 33% to 575 million people.[4]

Figure 3– Technology adoption by US consumers (1900 – 2021)



Source: Galaxy Research, Data: Our World In Data. Data as of December 2021. Most recent data available.

In addition to its growth-sector characteristics, cryptocurrencies present unique macro investment opportunities. The long-term viability of fiat currencies as a sound store of value has been challenged as the global economy grapples with rising inflation due to easy monetary policies post-GFC and increasing government debt. Cryptocurrencies like bitcoin, with their fixed total supply, offer a distinctive solution to these challenges, drawing attention from major financial institutions and investors. The mainstreaming of cryptocurrencies, particularly bitcoin, as investment vehicles has been further bolstered by the launch of spot bitcoin ETFs in the U.S. and evolving regulatory frameworks, such as Markets in Crypto-Assets Regulation (MiCA) in the EU, setting the stage for broader adoption and growth in the sector.

Where do cryptocurrencies fit in a portfolio?
Cryptocurrencies, particularly those with a fixed supply schedule like bitcoin, are a significant store of value and can provide a liquid long-term hedge against inflation. Historically, cryptocurrencies have had a low correlation to traditional asset classes, often even displaying a negative correlation especially during periods of stress in the financial system. Thus, can act as a portfolio diversifier.[5]

4 Cointelegraph, "Crypto users to reach almost one billion in 2024, analysts predict," December 22, 2023
5 Note: Diversification does not guarantee a profit or eliminate the risk of loss.

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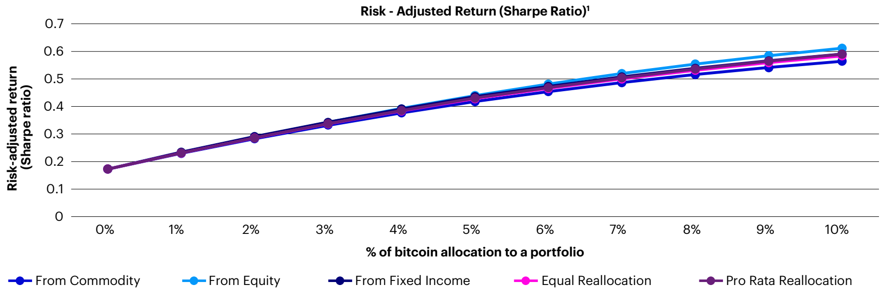
Figure 4 – The impact of adding bitcoin to a portfolio

Past performance does not guarantee future results.



	Average Annualized Returns*	Average Annualized Volatility*	Average Max Drawdown*
From Commodities	10.95%	13.81%	-23.09%
From Equities	10.80%	13.17%	-21.81%
From Fixed Income	11.30%	14.10%	-23.10%
Equal Reallocation	11.02%	13.68%	-22.51%
Pro Rata Reallocation	10.99%	13.55%	-22.27%

Source: Galaxy Research, The Impact and Opportunity of bitcoin in a Portfolio, October 02, 2023.[1]3-month Treasury-bill as of August 31, 2023 used as risk-free rate for Sharpe ratio calculations. Data as of Nov 2017 to Aug 2023. *Average across the 10 portfolios with that allocation method. The Bloomberg Galaxy Bitcoin Index incepted on May 1, 2018 and the Barclays Global Multi-Asset Index on Sept. 13, 2021, respectively. All information presented prior to the index's inception date is back-tested. Back-tested performance is not actual performance, but is hypothetical. Although back-tested data may be prepared with the benefit of hindsight, these calculations are based on the same methodology that was in effect when the index was officially launched. Index returns do not reflect payment of any sales charges or fees. Performance, actual or hypothetical, is not a guarantee of future results. An investment cannot be made in an index.

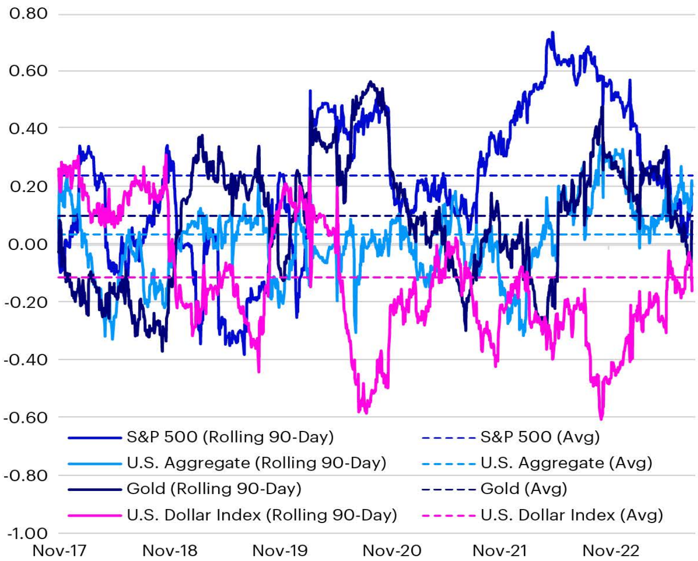
Furthermore, adding even just a 1% bitcoin allocation to a portfolio has been observed to significantly improve the portfolio's risk-adjusted returns. The most improvement was seen when a bitcoin allocation was funded from equities.

Investors can also participate in the growth of the wider digital assets economy by holding an ETF that invests in companies pioneering the adoption of blockchain and cryptocurrency into daily life.

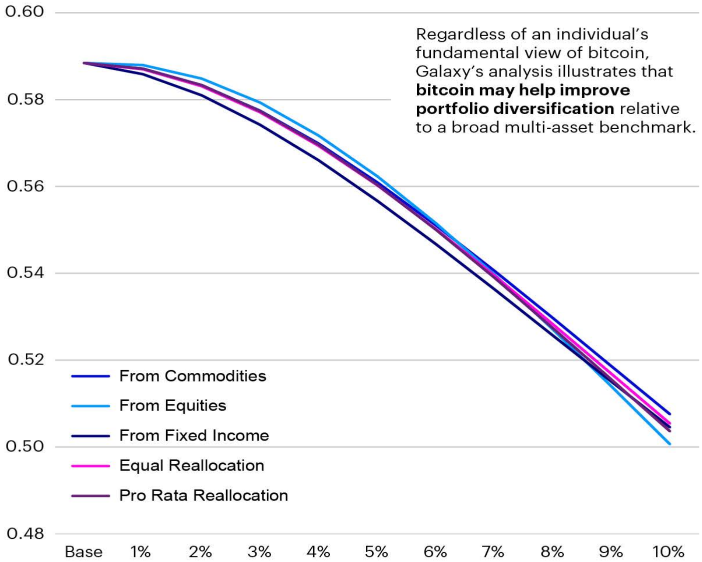
Appendix

Bitcoin correlation to traditional asset classes

Rolling 90-Day Correlations to Traditional Asset Classes
Nov 2017 to Aug 2023



Correlation With a Global Multi-Asset Benchmark
Nov 2017 to Aug 2023

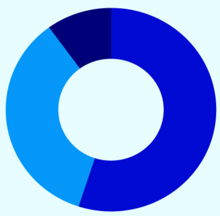


Source: Galaxy Research, The Impact and Opportunity of Bitcoin in a Portfolio, October 02, 2023. Data as of Nov 2017 to Aug 2023. Global Multi-Asset Benchmark = Barclays Global Multi-Asset index. An investment cannot be made into an index. See index definitions below. Past performance does not guarantee future results.

Methodology for Figure 4

Constructing the Model Portfolios

Starting with the Base Portfolio



	%
Equities	55
Fixed Income	35
Commodities	10

→

1% reallocation to bitcoin

5 Model Portfolios

- Reallocate 1% from Equities
- Reallocate 1% from Fixed Income
- Reallocate 1% from Commodities
- Reallocate equally (1/3%) from all three
- Reallocate pro-rata from all three

→

2% reallocation to bitcoin

5 Model Portfolios

- Reallocate 2% from Equities
- Reallocate 2% from Fixed Income
- Reallocate 2% from Commodities
- Reallocate equally (2/3%) from all three
- Reallocate pro-rata from all three

...

→

Repeat for 3-10% bitcoin reallocation

- Create the model portfolios for a 3-10% reallocation to bitcoin; 5 model portfolios each
- This creates a total of **50 model portfolios** for the asset allocation analysis
- Each model portfolio is rebalanced quarterly back to the target weights

Asset Class Benchmarks:

- **Equities** – S&P 500 Index
- **Fixed Income** – Bloomberg US Aggregate Bond Index
- **Commodities** – Bloomberg Commodity Index (BCOM)

An investment cannot be made into an index.

Why was the 5-year sample time frame chosen?

- A near five-year sample lookback period provides a comprehensive, yet conservative, window to assess the impact bitcoin may have on a diversified portfolio
- This sample period excludes the bull-run in 2017 but includes two "crypto winters" and the all-time-highs reached in 2021
- It is important to capture a representative sample of bitcoin's peaks, troughs, and volatility, while also excluding impacts of the base effect inherent with pre-2018 bitcoin price levels

Source: Galaxy Research, The Impact and Opportunity of Bitcoin in a Portfolio, October 02, 2023. See index definitions below. An investment cannot be made into an index.

Index definitions

- Cash is represented by the Bloomberg 1-3 Month U.S. T Bill Index.
- Int'l (International) Stocks is represented by the MSCI World exluding US Index.
- EM (Emerging Market) Stocks is represented by the MSCI Emerging Markets Index.
- Global Gov Bonds is represented by the FTSE World Government Bond Index (ex-USD) Index.
- Tsy (Treasury) Bonds (7-10) is represented by the Bloomberg US Treasury: 7-10 Year Index.
- US IG (Investment Grade) is represented by the Bloomberg US Aggregate Bond Index.
- US HY (High Yield) is represented by the Bloomberg US High Yield Bond Index.
- Gold is measured by the gold spot price quoted as US Dollars per Troy Ounce.
- TIPS is represented by the Bloomberg US Treasury Inflation Notes Index.
- Commodities are represented by the Bloomberg Commodity Index.
- Oil is represented by the West Texas Intermediate spot price in US dollar terms.
- US REITs (Real Estate Investment Trusts) are represented by the FTSE NAREIT All Equity REITS Total Return Index.
- REITs ex. US are measured by the FTSE EPRA/NAREIT Developed ex US Index.
- Bitcoin is represented by the Bloomberg Galaxy Bitcoin Index (BTC).
- Barclays Global Multi-Asset Index provides exposure to a diversified range of equity, gold and fixed income investments from global financial markets.

  Index performance is shown for illustrative purposes only and does not predict or depict the performance of any investment. Past performance does not guarantee future results.

  An investment cannot be made into an index.

Sharpe ratios for Figure 4

	From Commodities		From Equities		From Fixed Income		Equal Reallocation		Pro Rata Reallocation	
	Sharpe Ratio	Change	Sharpe Ratio	Change	Sharpe Ratio	Change	Sharpe Ratio	Change	Sharpe Ratio	Change
Base Portfolio	0.17	0	0.17	0	0.17	0	0.17	0	0.17	0
1% BTC	0.23	0.06	0.23	0.06	0.23	0.06	0.23	0.06	0.23	0.06
2% BTC	0.28	0.05	0.29	0.06	0.29	0.06	0.29	0.05	0.29	0.06
3% BTC	0.33	0.05	0.34	0.05	0.34	0.05	0.34	0.05	0.34	0.05
4% BTC	0.38	0.04	0.39	0.05	0.39	0.05	0.38	0.05	0.39	0.05
5% BTC	0.42	0.04	0.44	0.05	0.44	0.04	0.43	0.04	0.43	0.05
6% BTC	0.45	0.04	0.48	0.04	0.47	0.04	0.47	0.04	0.47	0.04
7% BTC	0.49	0.03	0.52	0.04	0.51	0.03	0.50	0.03	0.50	0.04
8% BTC	0.52	0.03	0.55	0.03	0.54	0.03	0.53	0.03	0.54	0.03
9% BTC	0.54	0.03	0.58	0.03	0.57	0.03	0.56	0.03	0.56	0.03
10% BTC	0.56	0.02	0.61	0.03	0.59	0.02	0.58	0.02	0.59	0.03

Source: Galaxy Research, The Impact and Opportunity of Bitcoin in a Portfolio, October 02, 2023. Data as of Nov 2017 to Aug 2023. Past performance does not guarantee future results. The performance results shown are hypothetical (not real) and were achieved by means of the retroactive application of the statistical model. It may not be possible to replicate the hypothetical results.

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Investment Risks

The value of investments and any income will fluctuate (this may partly be the result of exchange rate fluctuations) and investors may not get back the full amount invested. Past performance is not a guide to future returns.

There are specific risks involved with investing in cryptocurrencies exchange-traded funds/products. Investing in cryptocurrencies is high risk. Cryptocurrencies do not have any intrinsic value and may become worthless. Cryptocurrencies are subject to extreme price volatility and the price of cryptocurrency can be affected by factors such as global or regional political conditions and regulatory or judicial events.

Bitcoin has historically exhibited high price volatility relative to more traditional asset classes, which may be due to speculation regarding potential future appreciation in value. The value of an investment in bitcoin could decline rapidly, including to zero.

A disruption of the internet may affect the use of bitcoin or the blockchain.

Companies engaged in the development, enablement and acquisition of blockchain technologies are subject to a number of risks. Blockchain technology is new and many of its uses may be untested. There is no assurance that widespread adoption will occur. The extent to which companies held by the Fund utilize blockchain technology may vary.

Companies transacting on the blockchain are required to manage a user's account (or "wallet") which is accessed via cryptographic keys. Mismanagement, theft, or loss of the keys can adversely affect the company's operations on the blockchain.

Cryptocurrencies trade on exchanges, which are largely unregulated and, therefore, are more exposed to fraud and failure than established, regulated exchanges for securities, derivatives and other currencies.

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