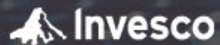


Live Pulse Webinar

The transformative potential of blockchain

Presented by Dr Chris Mellor
Head of Equity and Commodity ETF Product Management



novia
global

This marketing communication is for Professional investors and Qualified clients/sophisticated investors. Investors should read the legal documents prior to investing.

What is blockchain technology?

- A 'blockchain' is a ledger (a complete record) of all transactions and balances in a given system
- Cryptographic element ensures that each participant has the same view of the shared data
- Designed to increase trust between participants
- Blockchain's breakthrough is to bring the properties of physical asset transfer into the digital world

There are two types of blockchain:

Public (open) blockchain

- Open, transparent, decentralised
- Similar to email and the internet
- Bitcoin and cryptocurrencies

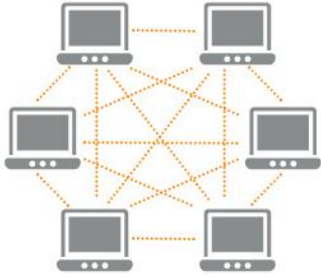
Private (closed) blockchain

- Controlled by a central entity
- Similar to traditional corporate systems
- Used by corporations to create assets, add functionality, and improve processes.

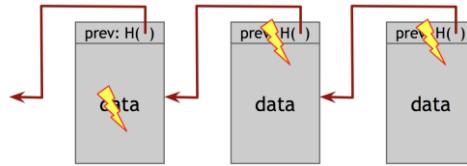
Source: Invesco

Public blockchains: open and permissionless

P2P network



Ledger structured as chain of blocks ('blockchain')



Distributed consensus ('mining')



Native cryptoasset



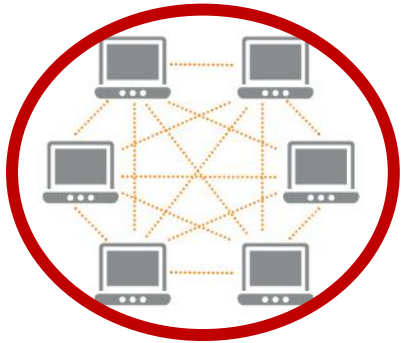
Key features

- Open access and permissionless usage
- Blockchain mining: solve computer science problem to earn the right to add records to the blockchain
- Requires native cryptoasset as reward mechanism

Source: Invesco, Cambridge Centre for Alternative Finance

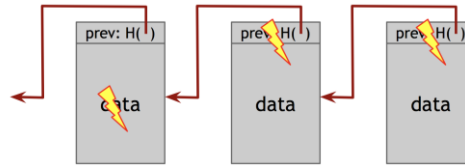
Private blockchains: closed and permissioned

P2P network



Access control

Ledger structured as chain of blocks ('blockchain')



Mining



Native cryptoasset



Key features

- Restricted access: gatekeeper required
- Replace *miners* with vetted *validators* and assign different permission levels
- No native cryptoasset required: secured by “off-chain” contractual agreements

Source: Invesco, Cambridge Centre for Alternative Finance

What is the potential for blockchain, is it the internet for assets?

- **The Internet fundamentally transformed the way we interact with information**
 - It reduced by several orders of magnitude the cost of sharing and accessing information.
 - It transformed the way we live, and ushered in a multi-trillion IT industry around the creation, storage, transmission and consumption of information.
- **Blockchain has the potential to do for assets what the internet did for information**
 - It could reduce by several orders of magnitude the cost of the creation, custody, transfer and usage of assets.
 - It could transform the way we live, and usher in a new industry on a global scale.

The Internet and information

First open system: Email (p2p info transfer)

Closed systems:

- Creation of information: Twitter, Instagram
- Storage of information: Dropbox
- Transmission of information: Netflix
- Consumption of information: Apple (iPhone, iPad)

Blockchains and assets

- First open system: e.g. Bitcoin (p2p transfer of value)
- Creation of assets: e.g. Bond-i
- Custody of assets: e.g. Fidelity, Zodia
- Transfer of assets: e.g. Tradelens
- Usage of assets: e.g. Signet, IBM

Source: Invesco

Three ways of using a blockchain

a) Direct issuance of (native) assets:

An asset (e.g. bond) is directly issued on a blockchain



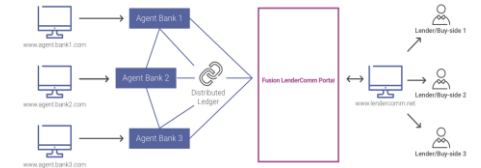
b) Tokenisation of existing assets:

An existing asset (e.g. USD held in custody) is digitally represented on a blockchain



c) Recordkeeping of external events:

External events/facts are being recorded on the blockchain (e.g., supply chain tracking)



Source: Invesco

Direct issuance and tokenisation creating digital assets

Crypto-Assets

Asset Native to layer 1 Blockchain protocol used to drive network incentives, process transaction and security. Decentralized, so not backed by a CB.



Stable-Coins

Asset backed token issued on public and private blockchain which represent the ownership interest in underlying stable asset like FIAT or precious metal.



Central Bank Digital Coins

CBDCs are Digital currencies issued by CB in wholesales or retail models. Mainly based on private Blockchain or DLT, with a centralised governance



Security Token

Security Token infers some form of ownership of an Asset of security financial instrument, such as bond, stock, fund,...

NFT

Non-fungible-Token infers to a certified and unique instance of a digital asset that could be anything from art, music or real estate.

Utility Token

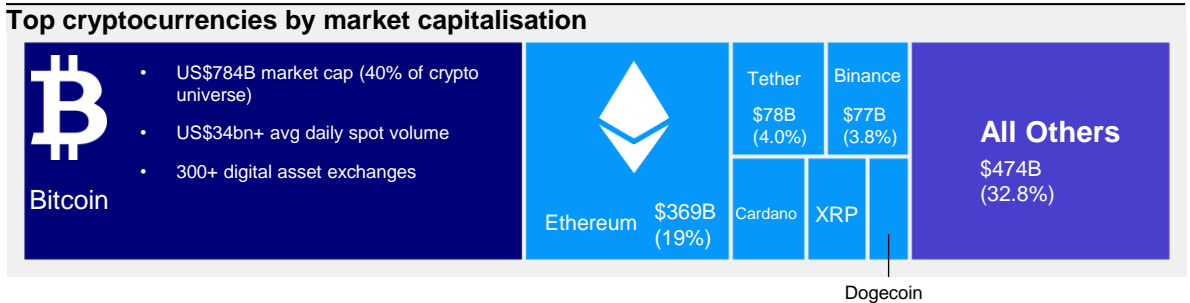
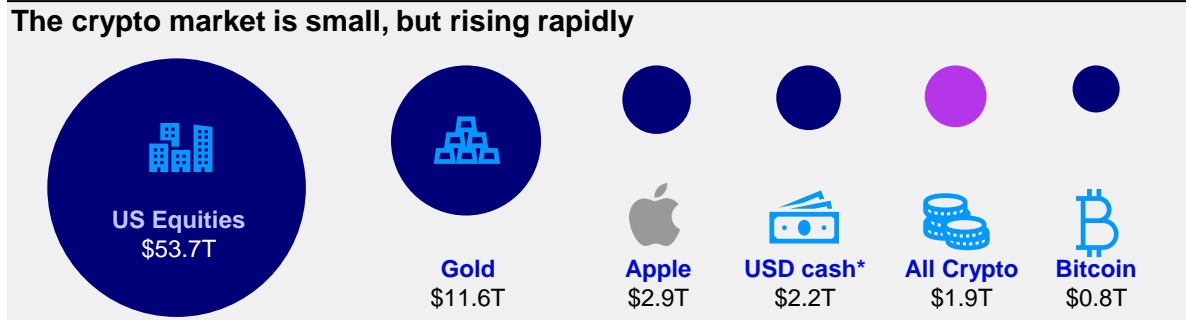
Utility Token infers the right to a service taken in the future.

Its is widely used to finance projects or as a reward mechanism.

Source: Invesco

Crypto assets are the most obvious example of blockchain use today

- First crypto asset was Bitcoin, launched in 2008
- Total value of all cryptocurrencies passing \$2 trillion in 2021
- Significant growth in investor interest:
 - Diversifying asset
 - Store of value
 - Inflation hedge
 - Speculation



Source: <https://coinmarketcap.com>, CoinShares Research estimates, Bloomberg, FED; as at 31 Dec 2021. *USD in circulation. ETH diamond (glyph)™ by the Ethereum Foundation is licensed under Creative Commons attribution 3.0. Original source: <https://ethereum.org/en/assets/#brand>. The use of the ETH diamond (glyph) logo is not intended to convey endorsement by the Ethereum Foundation.

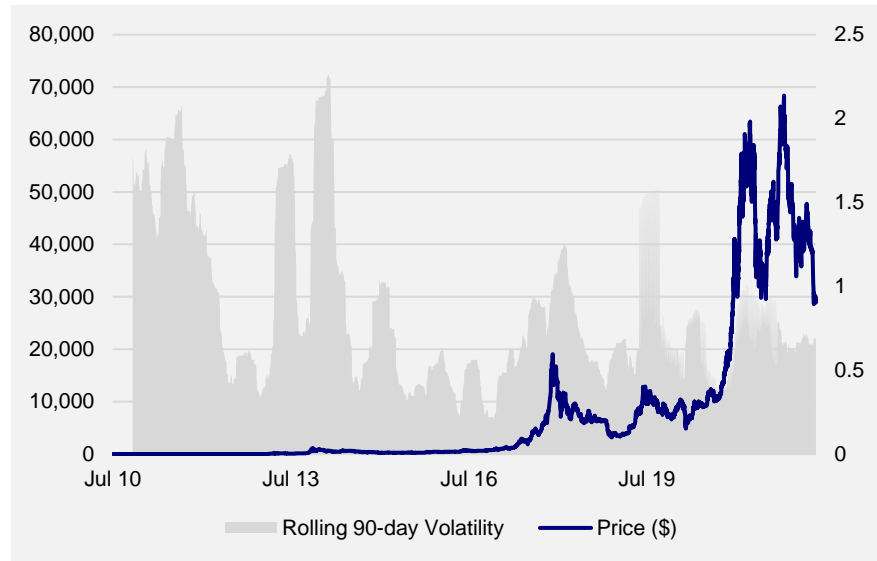
Bitcoin characteristics

Performance, volatility, correlation vs. other asset classes

Low correlations with other asset classes

	BTC	Blockchain equity	MSCI World	S&P 500	FTSE 100	STOXX 600	SEM	\$HY	\$IG	Global Agg	UST	Gold
BTC	1.00											
Blockchain equity	0.38	1.00										
MSCI World	0.16	0.67	1.00									
S&P 500	0.11	0.59	0.97	1.00								
FTSE 100	0.17	0.45	0.69	0.56	1.00							
STOXX 600	0.20	0.52	0.75	0.61	0.90	1.00						
SEM	0.12	0.37	0.50	0.39	0.47	0.51	1.00					
\$HY	0.12	0.48	0.63	0.54	0.54	0.59	0.71	1.00				
\$IG	0.03	0.10	0.09	0.04	0.04	0.07	0.57	0.44	1.00			
Global Agg	0.08	0.10	0.03	-0.06	-0.08	-0.05	0.46	0.25	0.73	1.00		
UST	-0.03	-0.19	-0.31	-0.31	-0.32	-0.30	0.17	-0.14	0.77	0.68	1.00	
Gold	0.08	0.11	0.07	0.02	0.01	0.00	0.18	0.06	0.33	0.47	0.33	1.00

Increased adoption has led to reduced volatility



Source: Bloomberg, Invesco, as at 25 May 2022. Correlation matrix shows 5-year correlation of daily returns. Data in USD.

Cryptocurrencies are subject to extreme price volatility as evidenced by the large daily movements in the price of Bitcoin since its inception.

There are many more applications of blockchain technology outside of crypto

Apr 8, 2020, 07:30am EDT | 6,970 views

IBM's Growing Blockchain Networks Could Strengthen Our Supply Chain In Response To COVID-19

Forbes, April 8, 2020

<https://www.forbes.com/sites/robertanzalone/2020/04/08/ibms-growing-blockchain-networks-could-strengthen-our-supply-chain-in-response-to-covid-19>

Japan to Have Blockchain-Based Stock Exchange in 2022

CONTRIBUTOR
Tanzeel Akhtar — CoinDesk

PUBLISHED
JAN 29, 2021 10:17AM EST

NASDAQ, January 29, 2021

<https://www.nasdaq.com/articles/japan-to-have-blockchain-based-stock-exchange-in-2022-2021-01-29>

EV supply chains seek clearer visibility with blockchain

Automakers are harnessing verification tools to underpin 'ethical choice' claims

Financial Times, September 9, 2020

<https://www.ft.com/content/3652b68e-206f-4e3a-9b3a-4d5ec9a285b7>

From Farm to Blockchain: Walmart Tracks Its Lettuce

The giant retailer will begin requiring lettuce and spinach suppliers to contribute to a blockchain database that can rapidly pinpoint contamination.

The New York Times, September 24, 2018

<https://www.nytimes.com/2018/09/24/business/walmart-blockchain-lettuce.html>

Investing in the blockchain opportunity

Digital assets are enabled by blockchain technology but equities provide exposure to blockchain *growth*

- Publicly listed companies are driving real, sustainable earnings from blockchain businesses.
- There is a broader ecosystem of companies with significant near term earnings potential related to both open and closed blockchain technologies
 - **Open blockchains:** Financial services, chip manufacturers, energy, mining
 - **Closed blockchains:** Technology solutions, consulting, payment systems

High liquidity

Listed equities provide a liquid way to gain exposure to the growth of blockchain technology

Earnings-focus required

Focusing on real earnings potential is key, not press releases and hype

Diversified portfolio

It is possible to build a diversified exposure to the growth of the ecosystem

Source: Invesco.

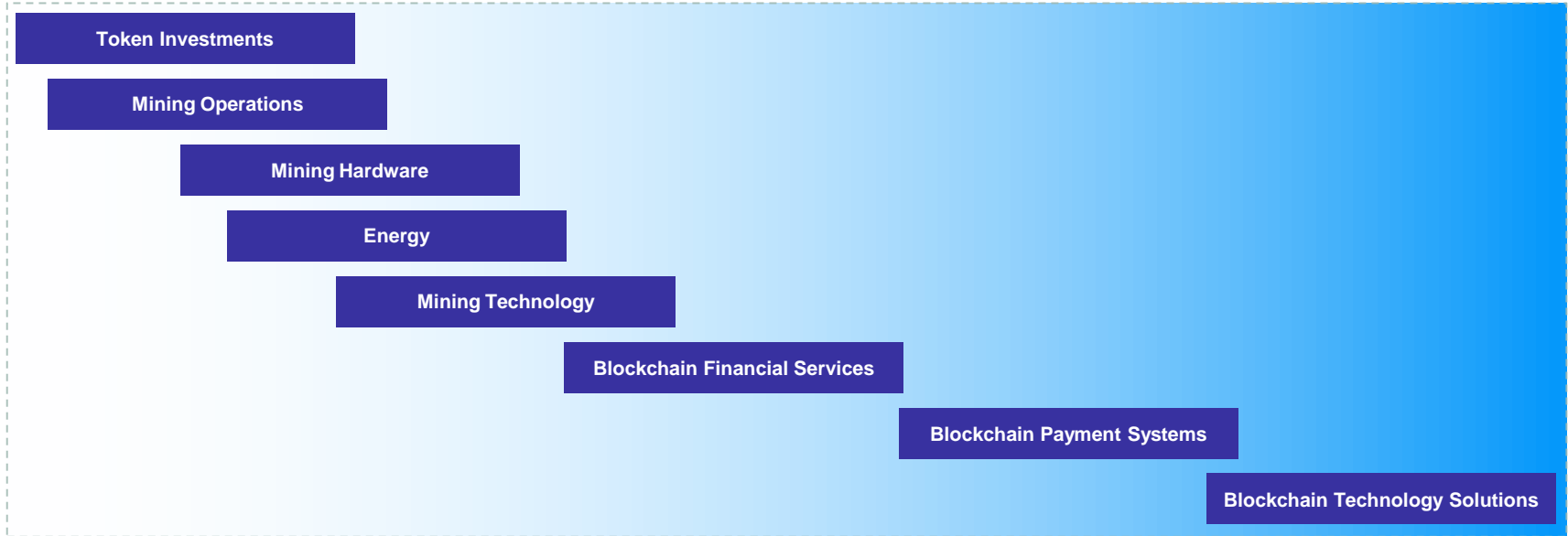
Appendix

Blockchain Industry – Business areas

Eight industrial blockchain areas

“Public Blockchain” (Cryptocurrency) exposure

“Private Blockchain” exposure



Source: CoinShares.

Blockchain monetisation strategies for listed corporates

Significant variety in potential earnings models

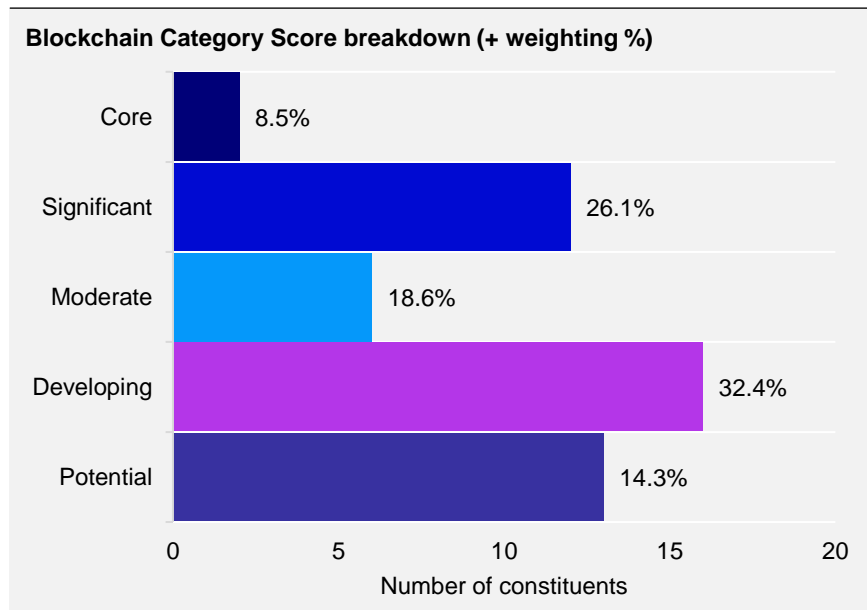
Blockchain Industry Area	Description	Examples		Index Weight
		US & Europe	APAC	
Blockchain Technology Solutions	Development or operation of commercial technological solutions related to blockchain	Oracle IBM	NTT Data NRI	20.2%
Blockchain Financial Services	Services or technology related to broking, trading, dealing, quoting, market making, clearing or exchanging cryptocurrency	CME Group Coinbase	Monex Kakao	39.3%
Blockchain Payment Systems	Platforms, systems or technology involved in the facilitation of payment services with blockchain technology	Block	Rakuten Ceres	4.2%
Mining Hardware	Activities related to the manufacture, distribution or assembly of cryptocurrency mining equipment or related components	AMD	TSMC Canaan	18.1%
Energy	The ownership, operation, management or development of energy assets, which are or have the potential to be used in mining	Alcoa	Rio Tinto	7.2%
Mining Operations	The operation, maintenance, ownership or provision of services related to cryptocurrency mining facilities	HIVE Hut 8	Bit Digital	8.9%
Mining Technology	Activities, research, software, tools, technology or processes related to the design, testing, cooling, control or analysis of cryptocurrency mining			-
Token Investments	Companies that hold or have rights to cryptocurrency tokens or derivatives	MicroStrategy		2.0%

Source: CoinShares. Weights and example for BLOCK index as of 9 May 2022 rebalance. Securities are mentioned for illustrative purposes only and are not intended as a recommendation to invest in any particular asset class, security or strategy.

CoinShares Blockchain Global Equity Index composition

Higher weightings for higher scoring stocks to maximise blockchain exposure

Name	Weight (%)	Blockchain Category Score
Monex Group Inc	5.11%	5
SBI Holdings Inc/Japan	5.05%	4
TSMC	4.66%	4
Kakao Corp	4.53%	4
GMO internet Inc	4.46%	4
Standard Chartered PLC	3.90%	3
Intel Corp	3.53%	3
Remixpoint Inc	3.48%	2
CME Group Inc	3.45%	3
Bitfarms Ltd/Canada	3.42%	5



Source: CoinShares, Bloomberg, as at 9 May 2022 rebalance. Securities are mentioned for illustrative purposes only and are not intended as a recommendation to invest in any particular asset class, security or strategy.

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Data as at 25 May 2022 unless otherwise stated.

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