



Alternative Investments



Introduction to Digital Assets



Exam Focus

- Financial applications of distributed ledger technology
- Investment features of digital assets in contrast with other asset classes
- Investment forms and vehicles used in digital asset investments
- Sources of risk, returns, and diversification among digital asset investments

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Distributed Ledger Technology (DLT)

Distributed ledger: a digital database that can be shared with a network of participants

- All transaction entries are recorded, stored, and distributed for all to see
- Each individual copy is a verified record of all current and previous transactions

Basic elements of a DLT

- A digital ledger
- A consensus mechanism to confirm new entries
 - Transaction validation and agreement to update the ledger by network parties
- A participant network

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Features of Distributed Ledger Technology

Cryptography is an algorithmic process to encrypt data

- Makes the data **unusable** if received by unauthorized parties
- Enables a high level of **network security** and database integrity
- Used to establish **proof of identify** of network participants

Smart contracts

- Computer programs to **automate transactions** on the network
- Prespecified terms and conditions define the automated transactions
- For example, the execution of contingent claims and transfer of collateral

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Example: Blockchain

Blockchain is a global digital ledger

1. A transaction takes place between a buyer and seller
2. A **block** with transaction information is created and broadcast to the network
3. Nodes in the network validate the transaction details and parties
4. The transaction is combined with other transactions to form **a new block**
5. The **new block** is added to the **previous block**
6. The transaction is completed, and the ledger is up to date

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Proof of Work (PoW)

Proof of work (PoW) protocol is a consensus mechanism to verify transaction

- **Miners** validate new transactions and add new transaction blocks to the chain
 - Miners earn cryptocurrency for this task
 - Miners need considerable computing power and have high energy costs
- The *PoW process* makes fraud and manipulation difficult and expensive
- The success of the network relies upon broad participation

The longest chain of blocks is only truthful representation of transactions

- The need for significant computer power makes it difficult for any individual, organization, or group to falsify the history of ledger transactions

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Proof of Stake (PoS)

Proof of stake (PoS) protocol: requires validators to **pledge capital** to vouch for a block's validity

- Validator verifies the transaction and **proposes** adding a new block
- Most of the other validators **confirm the validity** of the proposed block
- Protocols guard against **malicious parties** gaining a majority

Rewards for validation

- Successful miners who validate transactions receive a payment in a digital currency or a token

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Digital Assets: Question

The consensus protocol on a distributed ledger technology network refers to:

- A. the standardized approach that governs how digital assets generated from a blockchain network should be valued.
- B. programs embedded in electronic transaction records that are coded to self-execute according to predetermined conditions.
- C. the set of rules governing how blocks are cryptographically linked to the chain to become immutable on the distributed ledger network.

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Permissionless Networks

Permissionless networks: open to any user who wishes to make a transaction, and all users of the network can see all the network transactions

- Called an *open distributed ledger technology system*
- Any network participant can perform all network functions
- No centralized authority is needed to confirm validity of transactions
- The ledger is visible to all, so **trust** between parties is **not a requirement**
- Bitcoin is an example of an open permissionless network

Permissioned networks: restrict members from certain network activities

- Network participants have varying levels of access to the ledger

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Digital Assets: Question

Which of the following is not a potential benefit of distributed ledger technology?

- A. Facilitation of smart contracts.
- B. Energy-efficient way of record keeping.
- C. Immutable and secure transaction records.

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Types of Digital Assets

Digital assets

- **Cryptocurrencies:** digital units to store value
- **Digital currency:** near-real-time transactions without an intermediary
- **Tokens:** represent ownership rights

Cryptocurrencies

- **Bitcoin:** the first cryptocurrency launched in 2009
- **Altcoins:** other cryptocurrencies, stablecoins, meme coins
- **Central bank digital currencies (CBDCs):** digital version of fiat currency

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Types of Digital Assets

Tokens are used to verify ownership title and authenticity

- **Nonfungible tokens (NFTs):** link digital assets to certificates (e.g., digital art)
- **Security tokens:** digitize ownership rights to publicly traded securities
- **Utility tokens:** provide services within a network; pay for services
- **Governance tokens:** right to vote how a network is run

Transactions in physical assets such as real estate often require substantial **ownership verification** each time a transfer of ownership takes place:

- The process of **tokenization** streamlines this record of ownership

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Digital Assets: Question

The process where a node on a blockchain network pledges its digital asset to verify a new block's validity is called:

- A. tokenization.
- B. proof of work.
- C. proof of stake.

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Features of Digital Assets

Growth of digital assets

- 2013: there were approximately 70 cryptocurrencies; by 2022, close to 10,000

Distinguishing characteristics

- **No inherent value:** digital assets have no income or underlying cash flows
- **Decentralized ledgers:** to validate and record transactions; future Web3 system
- **Limited acceptance:** of digital assets as a medium of exchange to date
- **Legal and regulatory protection:** unclear and ambiguous regulatory treatment
- **Illegal activities:** not necessarily prohibited; anonymous transactions

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Investible Digital Assets

Cryptocurrencies

- Most popular are **Bitcoin** and **Ether** (80% of the market, July 2022)

Altcoins refer to the thousands of cryptocurrencies that exist outside bitcoin

- **Ether** launched in 2015 on the **Ethereum network**
- Ether has a programable blockchain, allowing users to construct applications
 - Called *smartcoins* and *smart contracts*

Stablecoins are altcoins designed to maintain a stable value

- They are collateralized by a basket of assets: legal tender, metals, other crypto

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Investible Digital Assets

Meme coins: altcoins often inspired by a joke and launched for entertainment purposes

- Gain popularity in a short time period
- Early purchasers may sell at a considerable profit

Example: Dogecoin

Dogecoin started as a lighthearted parody and gained popularity after social media endorsements by high-profile business figures.

The market value jumped to **\$80 billion** in May 2021. When the hype subsided, the market value had fallen to **\$11 billion** by May 2022.

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Digital Asset Investment Forms

Digital asset investment forms

- **Direct ownership** on the blockchain; use of a cryptocurrency wallet
- **Indirect investment** in exchange-traded products and hedge fund

Cryptocurrency exchanges

- **Centralized exchanges** provide direct trading platforms with volume, liquidity, and price transparency
 - Depending on jurisdiction, may or may not be regulated; vulnerable to hacks
- **Decentralized exchanges** operate in a similar way to Bitcoin
 - No central coordination; difficult to regulate, harder to hack, illegal activities?

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Digital Assets: Question

Digital assets differ from traditional financial securities in that:

- A. digital assets are subject to a broader legal protection framework.
- B. digital assets are not valued based on their expected future cash flow.
- C. transaction records of digital assets require a centralized intermediary.

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Digital Assets: Question

Cryptocurrencies are a common form of digital asset that:

- A. can be mined only through “proof of work” on blockchain networks.
- B. exist both in physical forms and electronic records with rights to use, buy, or sell by owners.
- C. can be used to transfer or store value, which allows time-efficient transactions between parties without the need for an intermediary.

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Investor Protection Concerns

Fraud and manipulation

- Both centralized and decentralized exchanges have potential problems with **fraud** and **manipulation** due to the lack of regulation and oversight.

Pump-and-dump schemes

- **EthereumMax (EMAX)**: a digital token launched in May 2021
 - Heavily endorsed by music and sports celebrities via social media
 - Over one month, the price rose rapidly, then crashed as EMAX executives dumped their holdings for a substantial profit

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Investor Protection Concerns

FTX bankruptcy

- FTX is a centralized exchange for spot cryptocurrency and stablecoins
- By 2021, it had 1.2 million users; by January 2022, had a value of \$31.6 billion
- FTX was considered a stable and trusted exchange, although was unregulated

Investor selloff

- In 2022, cryptocurrency prices declined, creating **liquidity pressures** for FTX
- **Investors lost confidence** in FTX when detail was revealed that a considerable amount of FTX capital was held in their own FTT token
- FTT fell from \$25 to \$1 in a week; in November 2022, FTX filed for bankruptcy

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Investor Protection Concerns

Losing access to a cryptocurrency wallet

- Cryptocurrencies stored in hardware wallets are accessed using a unique passkey
- **Losing access** to the passkey makes the cryptocurrency holdings **irretrievable**
- It is reported that approximately **20% of all Bitcoins** are not accessible

Cryptocurrency whales

- Individuals or entities that hold a large enough holding to **manipulate the price**
- **"Whalestats"** is a crypto whale-watching platform tracking whale trades

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Digital Assets: Question

Identify the direct and indirect forms of investment in digital assets:

Direct investment	Cryptocurrency ETF
	Cryptocurrency coin trust
	Initial coin offering
	Hedge fund investing in digital tokens
Indirect investment	Buying a digital art NFT
	Trading cryptocurrency stocks
	Trading tokens on a cryptocurrency exchange
	Buying Bitcoin futures on a futures exchange

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Indirect Forms of Digital Investment

Cryptocurrency coin trusts

- Investors trade **shares in trusts** that hold large pools of over-the-counter cryptocurrency
- The trusts are like **closed-end funds**; can trade at a premium or discount to NAV
- No need for investors to create a digital wallet and use encryption keys
- Trusts charge substantial fees

Cryptocurrency futures contracts

- **Bitcoin futures** trade on the Chicago Mercantile Exchange (CME); cash settled
- Inherent leverage in futures contracts; less liquid and more volatile

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Indirect Forms of Digital Investment

Cryptocurrency exchange-traded funds

- ETFs **do not directly invest** in cryptocurrencies
- Exposure is gained using cash and cryptocurrency derivatives
- No need for cryptocurrency wallets and passkeys
- Example risk warning: “. . . the value of an investment in the fund could decline significantly and without warning, including to zero.”

Other indirect forms of digital investment

- **Cryptocurrency stocks** such as crypto payment providers, blockchain networks
- **Hedge funds** investing in cryptocurrencies, or acting as miners

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Digital Forms of Investment for Nondigital Assets

Asset-backed tokens

- Digital claims on physical assets, financial assets, or financial instruments
- Collateralized by the **underlying asset**
- Derive their value directly from the **underlying asset**
- Increase liquidity by allowing **fractional ownership** of high-priced assets
- Digital **proof of ownership** and ownership transfer
- Reduces transaction and intermediation costs

Asset-backed tokens can be issued on smart contract platforms (e.g., Ethereum network) that allow decentralized applications (dApps) to perform automated

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Digital Assets: Question

A cryptocurrency ETF seeks to:

- gain exposure to cryptocurrencies through cash and cryptocurrency derivatives.
- replicate digital asset investment returns by investing directly in cryptocurrencies.
- gain exposure to the cryptocurrency theme by investing in public equities related to the digital asset sector.

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Digital Asset Investment Risk, Return, and Diversification

Digital assets risks and returns

- Bitcoin and Ethereum have seen **rapid price appreciation** since launch
- **Rapid price swings**, changes, and uncertainty
- Bitcoin return data shows **high return, high volatility**, and **low correlations** with traditional asset classes
- Volatility of Bitcoin is **higher** than volatility of traditional assets (e.g., S&P 500)

Medium of exchange

- Regulation of cryptocurrencies is **evolving**; uncertainty about legal protections
- Multiple countries have **placed restrictions** on trading and owning crypto assets

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Digital Asset Investment Risk, Return, and Diversification

Returns of cryptocurrencies are driven by the following:

- Market adoption, network effects, technological advancement
- Regulatory development
- Speculation and the general appetite for market risk

Diversification

- Cryptocurrencies have exhibited **low correlations** with traditional asset classes

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Digital Assets: Question

More institutional investors are allocating capital to cryptocurrencies because of their:

- A. low price volatility.
- B. high expected cash flow.
- C. low correlation with other traditional asset classes.

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Digital Assets: Question

The market value of a digital asset is primarily driven by:

- A. the future price expectation of speculators.
- B. the future earnings generated from the digital assets.
- C. the cryptographic algorithm of the blockchain network.

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Solutions

Digital Assets: Question

The consensus protocol on a distributed ledger technology network refers to:

- A. the standardized approach that governs how digital assets generated from a blockchain network should be valued.
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- ☒ C. the set of rules governing how blocks are cryptographically linked to the chain to become immutable on the distributed ledger network.

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Digital Assets: Question

Which of the following is not a potential benefit of distributed ledger technology?

- A. Facilitation of smart contracts.
- ☒ B. Energy-efficient way of record keeping.
- C. Immutable and secure transaction records.

The transaction validation process requires material computational power of all the miners on the network, especially in the case of proof-of-work consensus protocol.

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Digital Assets: Question

The process where a node on a blockchain network pledges its digital asset to verify a new block's validity is called:

- A. tokenization.
- B. proof of work.
- ☒ C. proof of stake.

This proof-of-stake protocol requires selected participants on a blockchain network, the validators, to pledge digital assets to vouch for the block's validity. This stake signals to the network that a validator is available to verify the veracity of a transaction and propose a block. Other validators who stake a digital asset to the network must then attest to the validity of proposed block.

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Digital Assets: Question

Digital assets differ from traditional financial securities in that:

- A. digital assets are subject to a broader legal protection framework.
- ☒ B. digital assets are not valued based on their expected future cash flow.
- C. transaction records of digital assets require a centralized intermediary.

Most digital assets do not have a fundamental value based on underlying assets or on the potential cash flow or earnings they are expected to generate.

To date, the legal and regulatory frameworks for digital assets are still evolving, and there is generally less legal protection compared to traditional financial securities. Digital asset transactions are recorded on a distributed ledger, and no centralized intermediary is required in the process.

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Digital Assets: Question

Cryptocurrencies are a common form of digital asset that:

- A. can be mined only through “proof of work” on blockchain networks.
- B. exist both in physical forms and electronic records with rights to use, buy, or sell by owners.
- ☒ C. can be used to transfer or store value, which allows time-efficient transactions between parties without the need for an intermediary.

Cryptocurrencies are used to transfer or store value, which allows near-real-time transactions between parties without the need for an intermediary. As electronic mediums of exchange, cryptocurrencies lack physical form and exist only as electronic records on distributed ledgers. Depending on the particular consensus protocols used, cryptocurrencies can be generated either by “proof of work” or “proof of stake” by miners or validators on networks.

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Digital Assets: Question

Identify the direct and indirect forms of investment in digital assets:



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Digital Assets: Question

A cryptocurrency ETF seeks to:

- ☒ A. gain exposure to cryptocurrencies through cash and cryptocurrency derivatives.
- ☐ B. replicate digital asset investment returns by investing directly in cryptocurrencies.
- ☐ C. gain exposure to the cryptocurrency theme by investing in public equities related to the digital asset sector.

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Digital Assets: Question

More institutional investors are allocating capital to cryptocurrencies because of their:

- A. low price volatility.
- B. high expected cash flow.
- ☒ C. low correlation with other traditional asset classes.

The value of Bitcoin and other cryptocurrencies is based solely on asset appreciation, with no underlying cash flows. Historically, their price volatility has been extremely high. As such, cryptocurrencies are often considered a high-risk investment. Nevertheless, more institutional investors allocate their investment into cryptocurrencies because of the low historical correlation with other traditional asset classes, providing potential diversification benefits to a portfolio.

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Digital Assets: Question

The market value of a digital asset is primarily driven by:

- ☒ A. the future price expectation of speculators.
- B. the future earnings generated from the digital assets.
- C. the cryptographic algorithm of the blockchain network.

Unlike financial assets, most digital assets do not have an inherent value based on underlying assets or on the expected cash flow that can be generated. In other words, digital assets do not have a fundamental economic value. Their prices depend solely on the expected asset appreciation due to the perceived scarcity value and the potential ability to transfer value in the future. However, that value reflects market expectations at the time the transaction takes place.

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