



UNIVERSITY *of* NICOSIA

Session 5.2

# Tokenomics, Asset Tokenization and Prediction Markets

BLOC 611: Decentralized Finance

# Objectives

- Introduce the concept of tokenomics in the wider context of “regular” economics
- Present the key concepts that relate to token economics and market behaviour
- Explore the concepts and innovations that are leading up to tokenization
- Discuss the benefits of tokenization for the various stakeholders
- Present prediction markets and discuss key related topics

# Agenda

1. Tokenomics
2. Tokenization
3. Prediction Markets
4. Conclusion
5. Further Reading

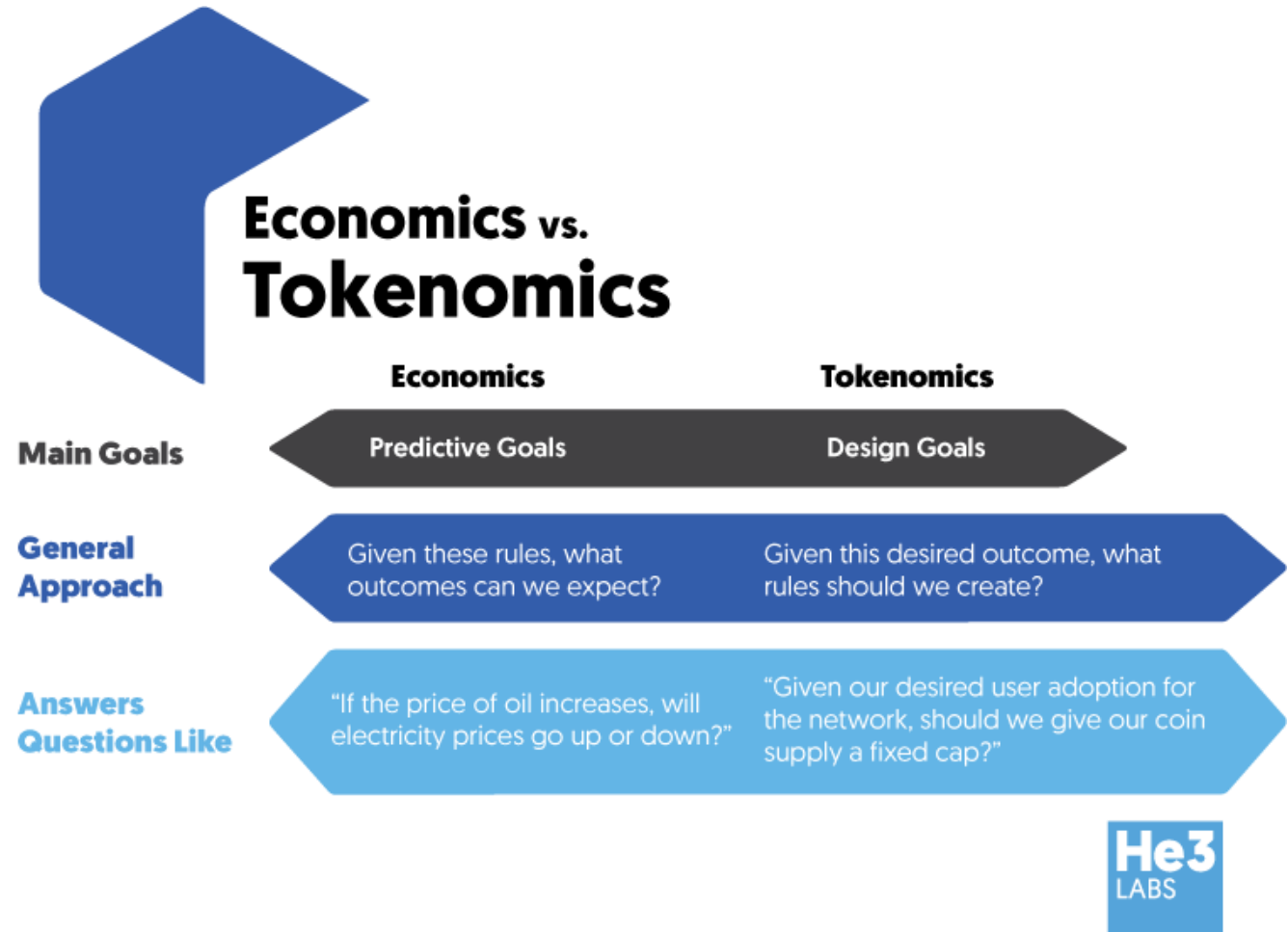
Disclaimer: As usual, the inclusion of any particular blockchain project or organisation is for educational purposes only. This should not be construed as an endorsement or investment advice.

## Session 5.2: Tokenomics, Asset Tokenization and Prediction Markets

# **1. Tokenomics**

# Tokenomics

- Tokenomics is a compound word referring to the economic (monetary) aspects of a token.
- The most popular example of tokenomics is Bitcoin.
  - Bitcoin's supply is fixed to 21 million.
  - Through halving events, its inflation decreases overtime.
  - This monetary policy is embedded in the protocol.



Source: <https://www.he3labs.com/blog/2018/6/4/what-is-tokenomics>

# Micro-tokenomics & Macro-tokenomics

**Micro-tokenomics**, like microeconomics, is a term that refers to the rules and mechanisms of and within a certain blockchain/protocol.

It focuses on the **individual** build-in properties and parameters of a blockchain/protocol and includes:

- Blockchain security model
- Economic security (incentives, game theory, mechanism design)
- Monetary policy (inflation rate, staking, vesting, etc.)
- Token purpose
- Token functionality
- Token utility

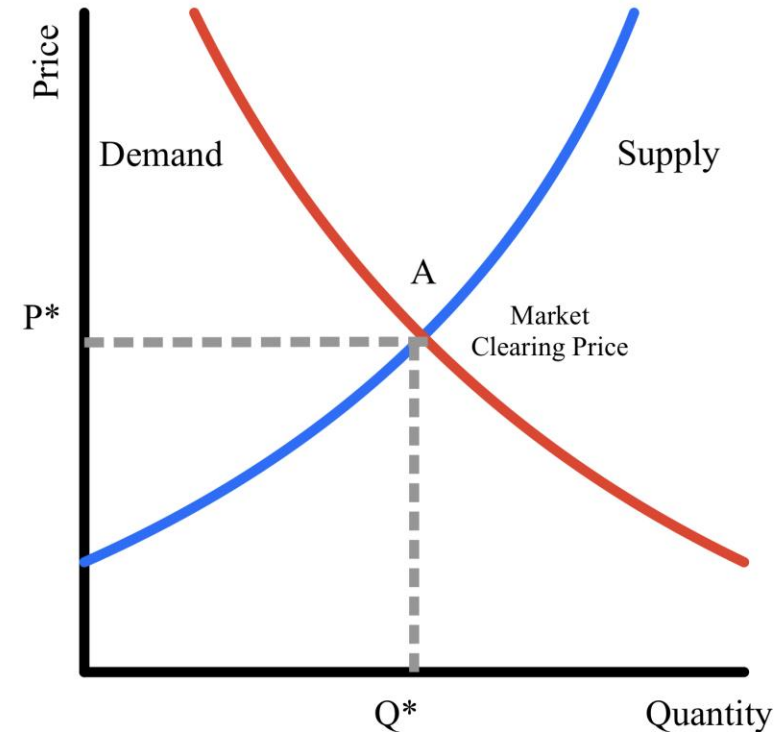
**Macro-tokenomics**, like macroeconomics, pertains to the entirety of the blockchain ecosystem. It is about the inter-dependency of the various stakeholders and how their actions influence the network. It includes:

- Ecosystem Growth
  - Adoption by individuals and businesses
- Governance
- Distribution
- Regulation
- Synergies with other technologies

### Factors influencing token price

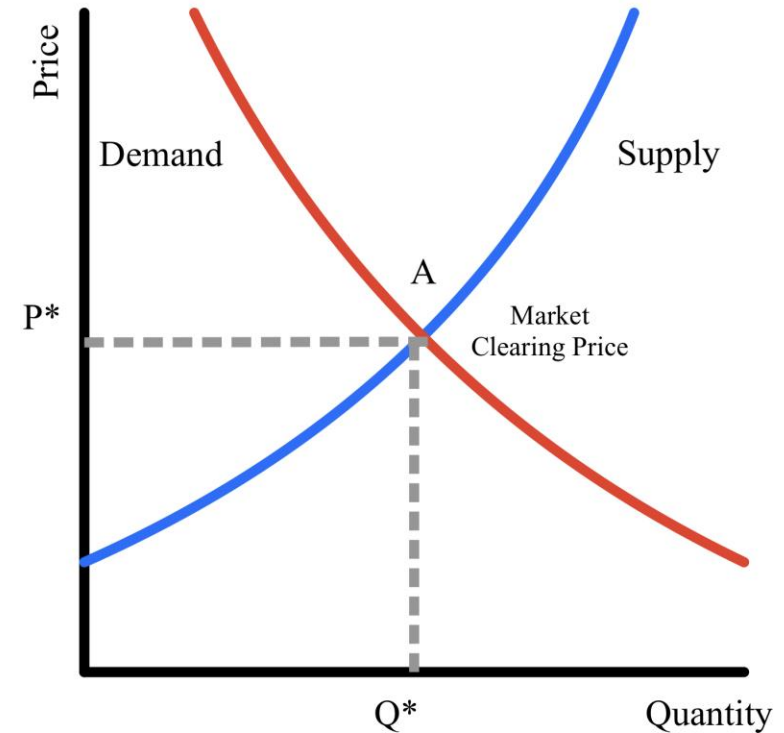
There are 3 main factors influencing the supply and demand for a token (as with most things):

- **Supply and demand**  
The well-known supply / demand curve and how it affects prices
- **Substitutes**  
How substitute products affect the supply and demand curve.
- **Time shifting**  
How time shifting affects the supply and demand curve.



# Supply and demand

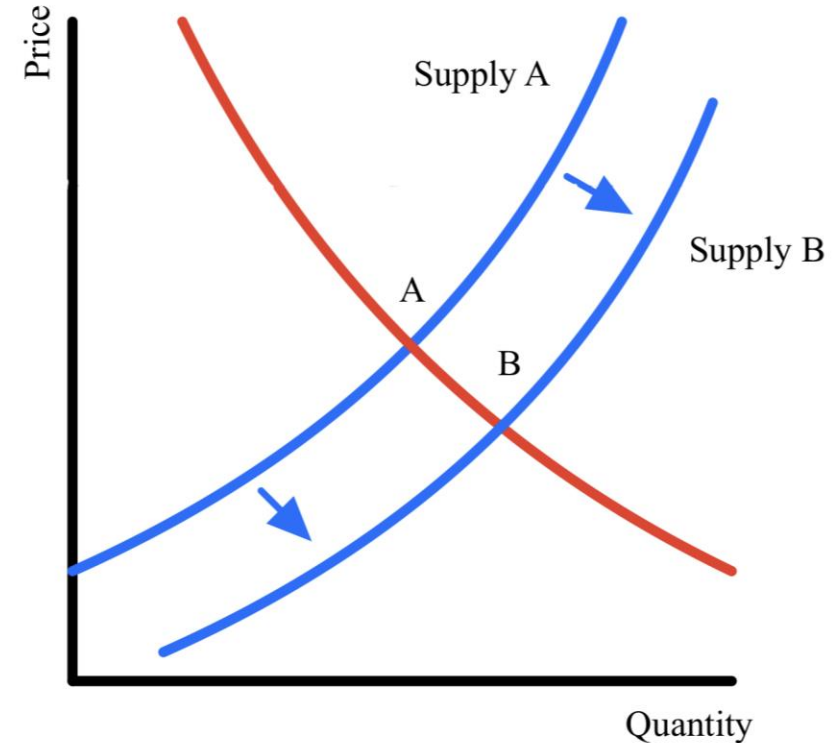
- The blue curve is the supply curve: the higher the price, the higher the aggregate supply at this price
- The red curve is the demand curve: the higher the price, the lower the demand volume at this price
- Where the curves meet, is the (theoretical) market clearing price and volume.





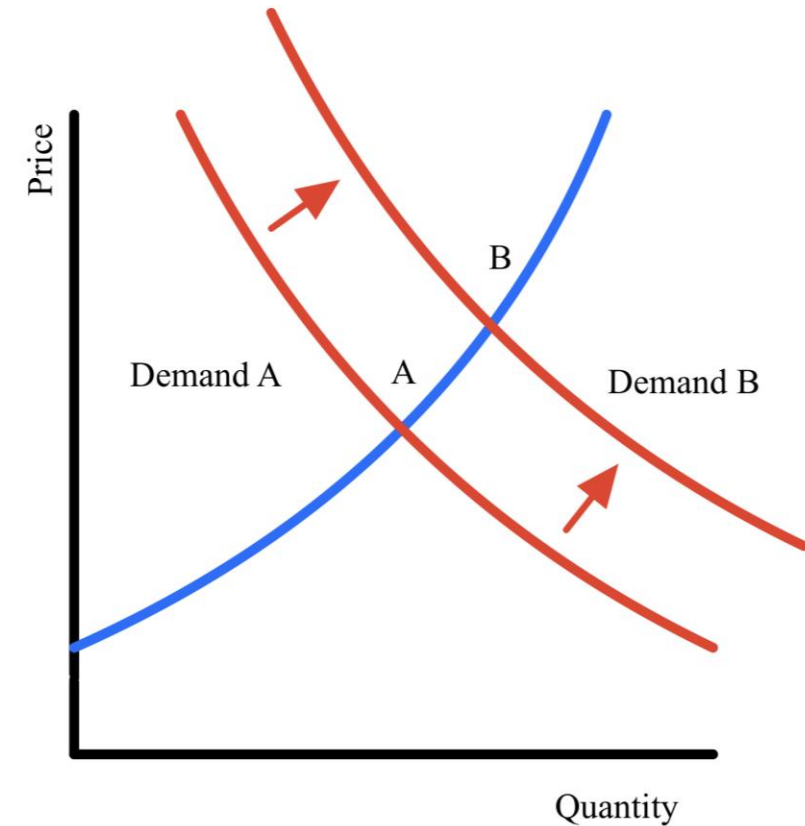
### Shifts in supply

- When the supply curve shifts due to:
  - (a) additional volume supplied
  - (b) lower price
  - (c) combination
- The new clearing point B is at higher volume and lower price than the original clearing point A



### Shifts in demand

- Demand shifts work exactly like supply shifts, and can again be driven by changes in demand volume, demand price, or combinations thereof
- In this case the shift of the demand curve leads to increased prices and clearing volumes.



# Token Supply – **Must Know Definitions**

- **Initial Token Supply**

- The circulating tokens when the token starts to be traded on secondary markets (exchanges)

- **Circulating Supply**

- The current number of tokens on the market

- **Total Token Supply**

- The total number of tokens that will ever be minted.

- **Unlimited Supply**

- When the Total Token Supply is not fixed/bounded (e.g. Ether).

- **Max Token Supply**

- The Total Token Supply minus destroyed (burnt) tokens.

- **Minted Tokens**

- The tokens created so far.

# Token Supply – **Must Know Definitions (Cont.)**

- **Market capitalization**

- The total market value of all tokens in circulation (circulating supply multiplied by token price).

- **Fully Diluted Market capitalization**

- The market capitalization if the Max Token Supply was in circulation.

- **Inflationary Token**

- Tokens that do not have or have not reached maximum supply.

- **Deflationary Token**

- Tokens that have reached their maximum supply and their total quantity can only be reduced in the future.

# Token Monetary Policy – the example of Bitcoin

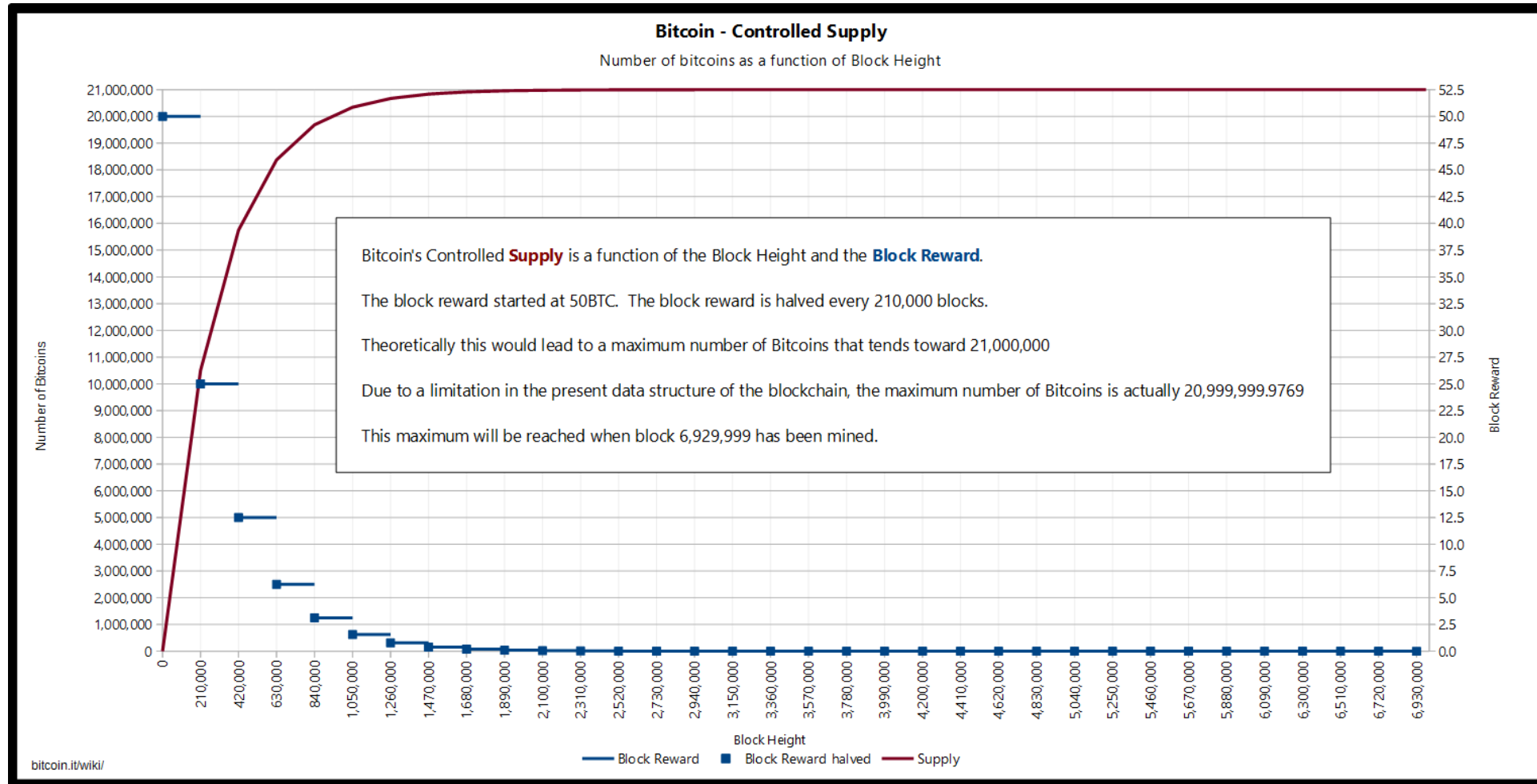
Bitcoin has a **controlled supply** of circulated coins.

- The total token supply is fixed to **21 million**.
- Of these, around 19 million have been minted until 2021.
- So, Bitcoin is still an inflationary token.
- Once the last Bitcoin has been minted, the token will become deflationary

Bitcoin's inflation is decreasing due to halving events, which reduce the number of new tokens that are minted over time.

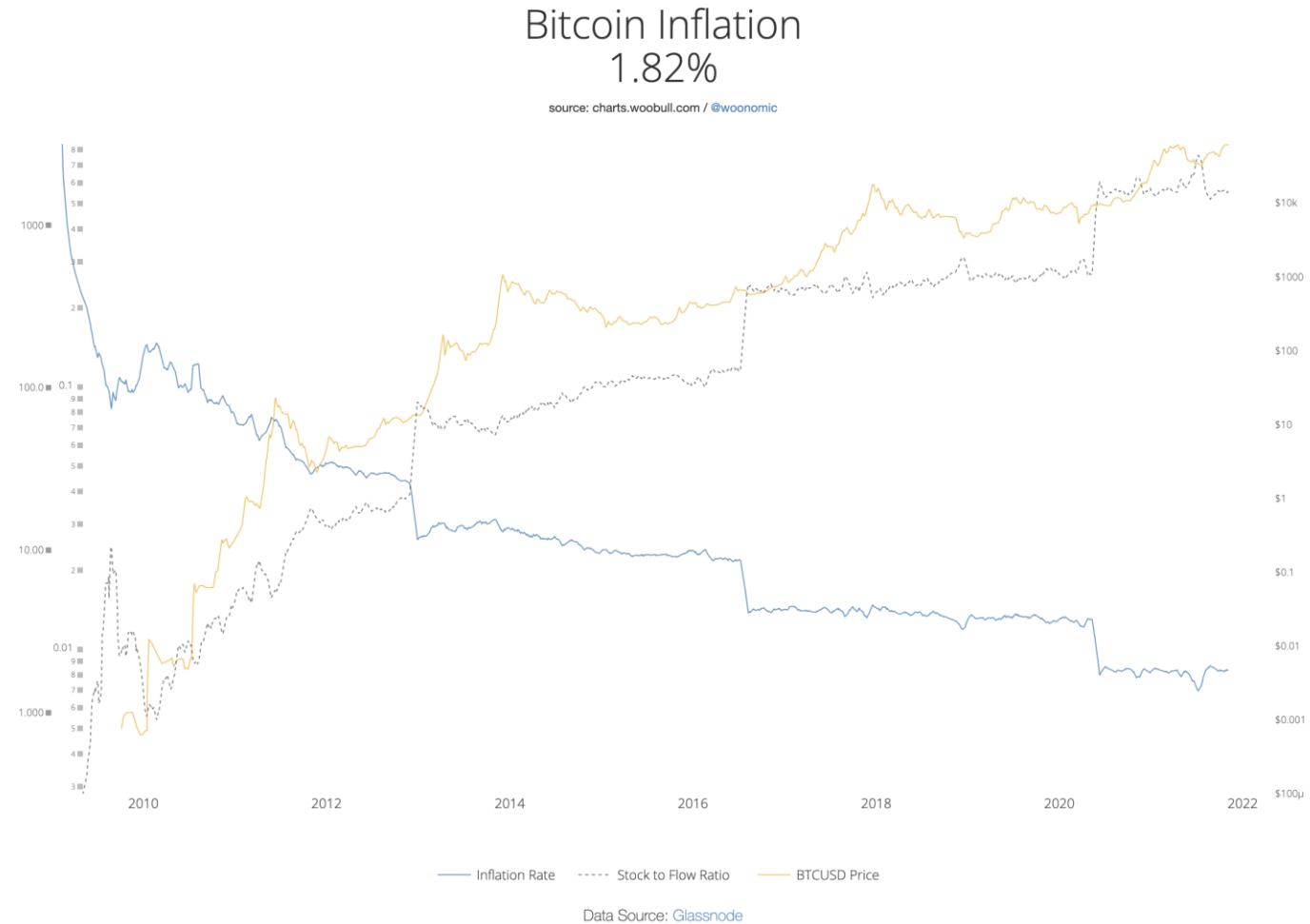
- Between 2016-2020, Bitcoin's annual inflation rate was **4%**.
- After May 2020 (last halving event) the annual inflation rate decreased to **18%**.

# Token Monetary Policy - the example of Bitcoin (continued)



Source: [https://en.bitcoin.it/wiki/Controlled\\_supply](https://en.bitcoin.it/wiki/Controlled_supply)

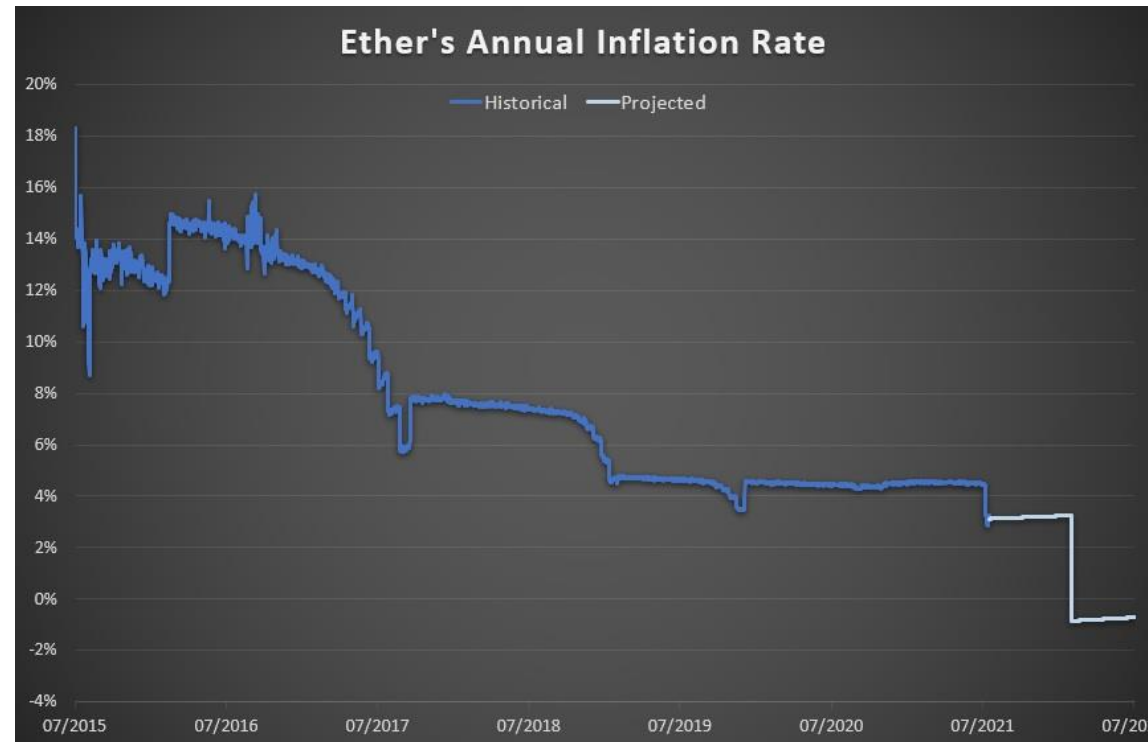
# Token Monetary Policy - **the example of Bitcoin** (continued)



# Token Monetary Policy – the example of Ethereum

Ether has an **unlimited token supply**.

- Its early annual inflation rate was double-digit, while lately it has fallen to around 4%.
- With the upcoming transition to Ethereum 2.0, the inflation rate will depend on the amount of ETH that is staked and transaction fees.



Source: <https://ethresear.ch/t/analysis-and-projection-of-ethers-inflation-rate/10341>



# Token Monetary Policy – the example of Ethereum

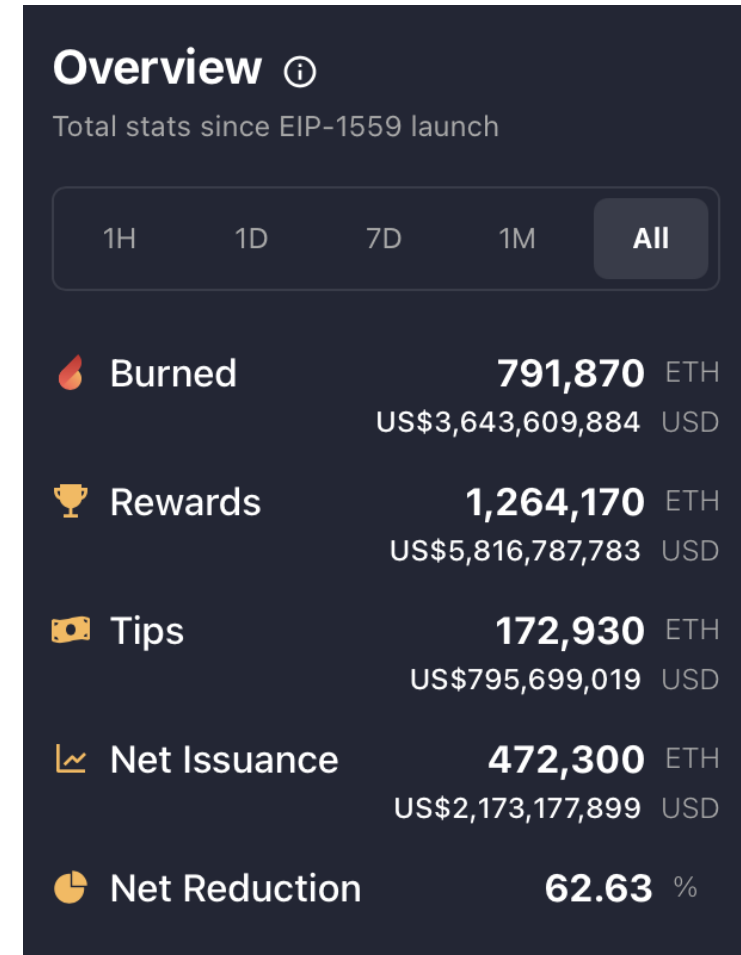
The EIP1559, is an Ethereum Improvement Proposal which changes the way gas fees are calculated.

In the new system (implemented in August 2021), gas fees are calculated by an automated bidding system (instead of manual auction). The gas fees will fluctuate according to network congestion.

At the same time, part of every transaction fee is burned (destroyed by being sent to a defunct address), and thus removed from circulation

This in theory can reduce the supply of Ether and potentially boost its price.

Source: <https://watchtheburn.com>



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## **2. Tokenization**

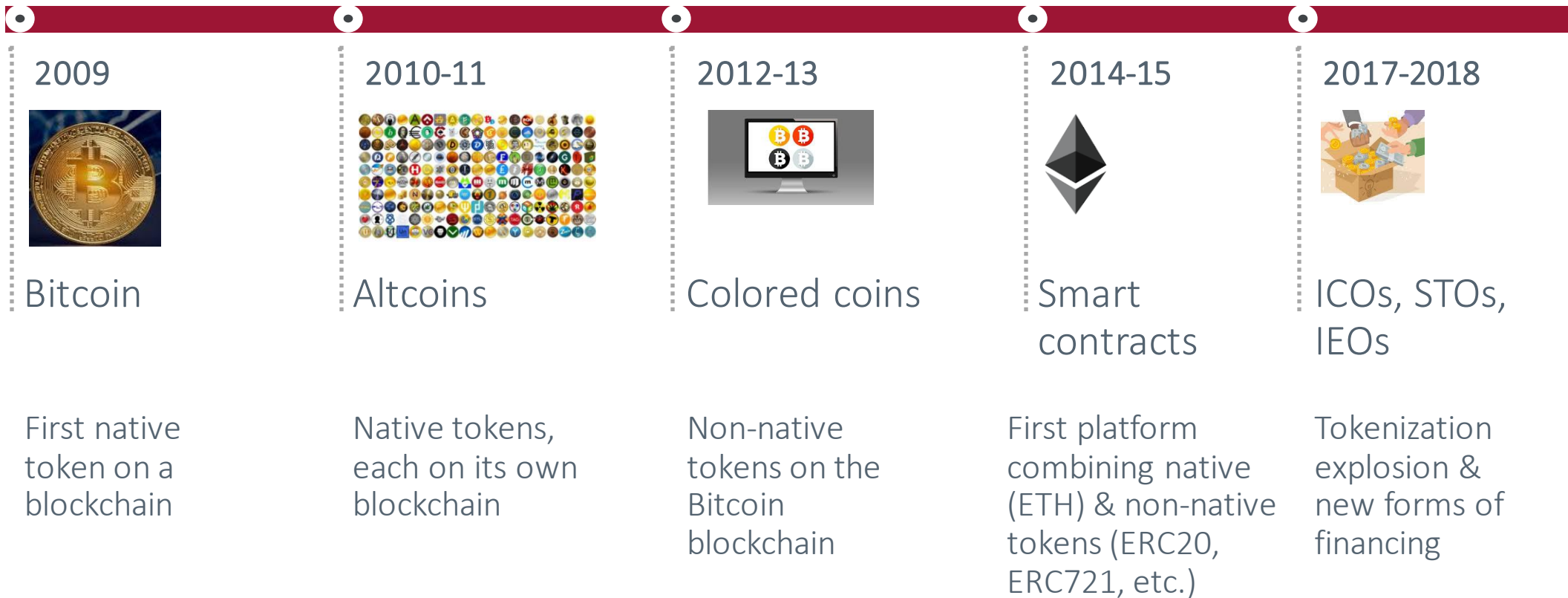
# Introduction to Tokenization

**Tokenization** is the process of converting ownership rights into digital tokens that can be issued and traded on a blockchain.

Tokenized assets are a superset of derivatives, in the sense that they tokens that used to represent “something else”. They can represent, among others:

- **Physical assets:** securities, real estate, art, etc.
- **Digital rights:** license rights, access rights, intellectual property rights, future income rights, etc.

# Many developments in blockchain lead up to tokenization



# The next phase of digitizing physical assets

### Benefits

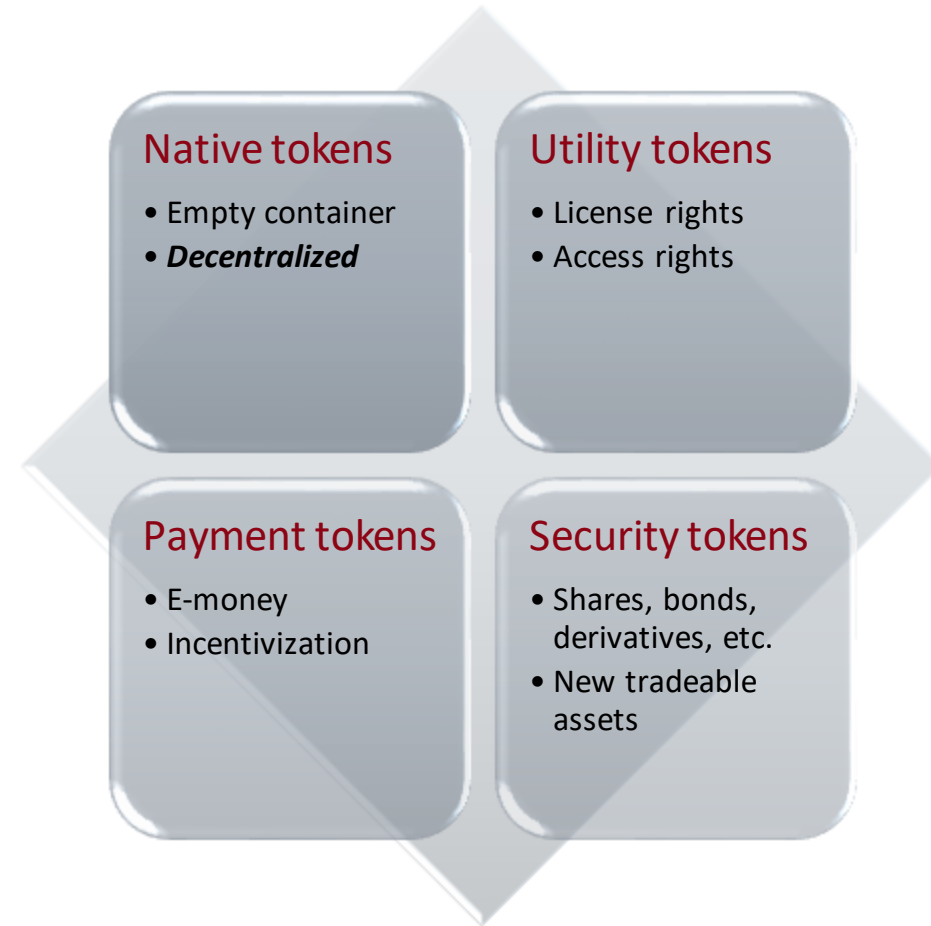
- **“Ease of use”**. Tokens are trivially created, stored, traded
- **Fractional Ownership**. Think of the prohibitively expensive real estate market in the Bay area or NFTs such as CryptoPunks. Tokenization allows investors to own fractions of the asset.
- **Accessibility**. Again, think of the volume of transactions in real estate or certain commodities, versus the volume of transactions in stocks or crypto.
- **Market efficiency**. Tokenization may smooth out boom-and-bust cycles of illiquid markets by making them more liquid and organized.

### ○ Challenges

- Generally, not decentralized: **intermediaries will ALWAYS be needed** for non-native assets
- Legal recognition

### An alternative classification

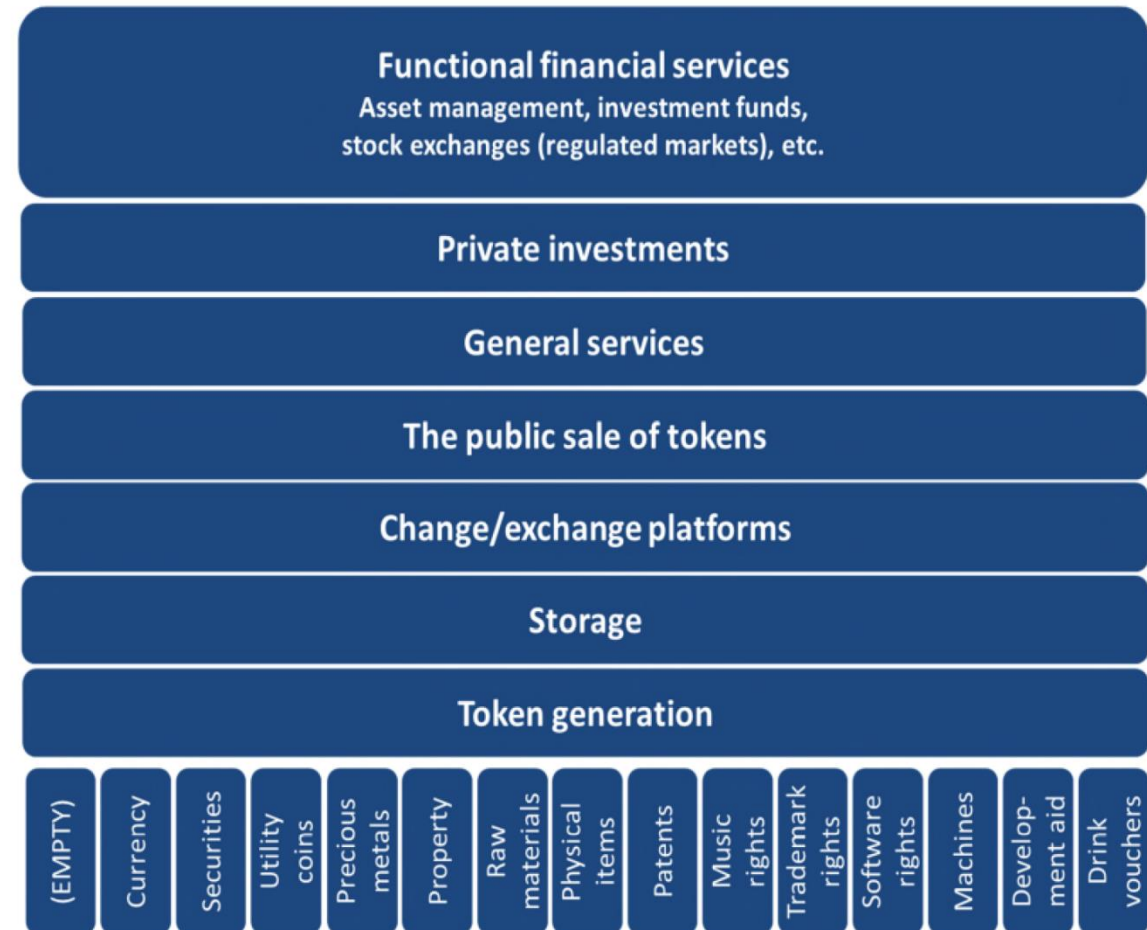
- Tokens as **containers**
- A token can be:
  - Either **loaded** with a **right** that represents a real-world **asset**
  - Or not – a token container can also be empty (**native asset**)



### Decentralization does not destroy intermediaries; it replaces them

- **New intermediaries** needed for all non-native assets

- Token **generators**
- Token **issuers**: disclosure requirements and investor protection
- Token **validators**: know who owns tokens and can legally enforce represented rights and obligations
- Token **custodians**
- Token **exchange service providers**
- Token **identity service providers**
- etc



### Lichtenstein Blockchain Act (2020)

- The Lichtenstein Blockchain Act foresees no less than **ten** different roles (& associated registration/licensing requirements):

- Personal requirements
- Organizational requirements
- Minimum capital requirements
- Internal control mechanisms
- Due diligence requirements (KYC, AML, CTF)

	Token Generator	Token Issuer	TT Key Depository	TT Token Depository	Physical Validator
Registration Duty	✓	✓ *	✓	✓	✓
<b>REQUIREMENTS</b>					
<b>Personal Reliability</b> (bankruptcy and criminal law)	✓	✓	✓	✓	✓
<b>Organizational</b> Suitable business structure and appropriate written internal proceedings and control mechanisms	✓	✓	✓	✓	✓
<b>Minimum Capital</b>	✗	Token <= 5 Mio = 50k Token > 5 Mio = 100k Issuance > 25 Mio = 250k	100k	100k	Varies depending on value of the property being guaranteed max. CHF 250'000
<b>Special internal control mechanisms</b>	✓	✓	✓	✓	✓
<b>Licensed as Trustee</b>	✗	✗	✗	✗	✗
<b>SUPERVISORY FEES</b>					
<b>Minimum Fee</b>		CHF 500	CHF 500	CHF 500	CHF 1'000
<b>Fee</b>	CHF 250	0.25% of CHF equivalent value of money received during issuance	0.25% gross revenue received from services provided.	0.25% gross revenue received from services provided.	0.25% gross revenue received from services provided.
<b>Maximum Fee</b>		CHF 100'000	max. CHF 100'000	max. CHF 100'000	max. CHF 100'000
<b>DUE DILIGENCE ACT APPLICABLE</b>					
	✗	✓	✓	✓	✓



### Real Estate tokenization (1/3)

- Compared to stocks, bonds, or even crypto, real estate investments:
  - Require higher initial capital
  - The market is more illiquid and inefficient
  - Transactions are more time-consuming, costly, and involve a number of intermediaries (appraisers, agents, solicitors, insurers, mortgage providers, etc.)
  - Transactions are mostly private, and data availability is scarce. This feeds into the inefficiency and inefficiency of the market discussed in the previous points.
  - There are no organized exchanges for real estate trading. The market is fragmented, again feeding into higher costs and illiquidity.
  - Investment selection and even diversification can be more costly
  - Finally, real estate ownership in the conventional sense comes with added risks, such as risk from selecting tenants, real estate cycles, value depreciation, etc.

### Real Estate tokenization (2/3)

- Consider the following example: **Alice** owns a Frankfurt property valued at €200,000
  - Tokenizes the property into 100,000 tokens, each valued at €2
  - Alice needs liquidity of €20,000, so she enlists 10,000 tokens in the platform, effectively putting 10% of the property for sale
- **Bob** wants to invest in Frankfurt properties, but his total capital is only €5,000
  - Obviously, he cannot buy any property in the city!
  - But, he can acquire 2,500 tokens of Alice's property (or may even diversify across properties)
  - Since he effectively now owns 2.5% of the property, Bob receives 2.5% of the property's rental income, as long as he holds the tokens
  - Bob may decide to sell his tokens in the secondary market. The price of the token will fluctuate to indicate the movement of real estate prices in Frankfurt and the particular property

### Real Estate tokenization (3/3)

While no silver bullet, real estate tokenization can facilitate significant improvements across a number of areas, including those discussed in the previous slides.

- Specifically, real estate tokenization could
  - Improve liquidity
  - Increase the speed of transactions
  - Promote decentralization and cost efficiency by relying less on intermediaries
  - Move real estate transactions to organized exchanges
  - Increase transparency
  - Provide better access to market data and other information
  - Reduce the initial capital required
  - Enable diversification and global access in properties
  - Support auditing and due diligence

### Advantages of tokenization for the various stakeholders

Indicatively, when it comes to the advantages of real estate tokenization for the various stakeholders:

- **Owners** can raise capital fast with more flexible financial terms compared to financial institutions and without needing to sell or mortgage the entirety of their property.
- **Developers** can access a global market of accredited and retail investors, achieving quick closure and better terms for project financing.
- **Investors** can invest in real estate assets without minimum capital requirements, build risk-balanced portfolios of fractional ownership assets in different markets, and trade in/out of their investments online.
- **Financial institutions** can access new markets for non-performing assets in their balance sheets.
- **Regulators** can oversee market transactions as part of their KYC, AML, CTF and investor protection missions.



### Future use case: personal tokens (1/3)

**People need funding at their early or middle career stages to pursue their goals**  
**Athletes** need support for training, equipment, traveling.

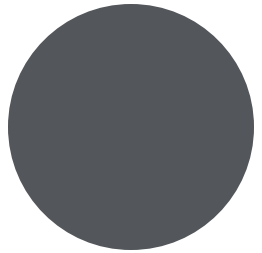
**Artists** need to produce/promote their work, go on tour.

**Students** need to finance their studies.

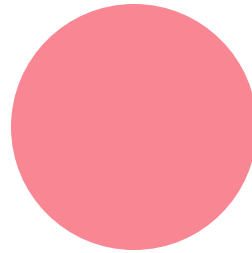
Financing options are limited:

**Loans (Debt)**

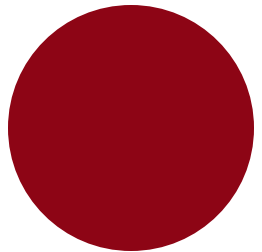
### Future use case: personal tokens (2/3)



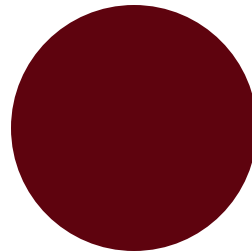
Platforms that tokenize career prospects (future incomes) using blockchain



Enable investors to fund talent, investing on their future achievements and income



Enable talent to build up careers and/or insure against future risks



Markets that bring together investors and talent can be created



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### Future use case: personal tokens (3/3)

Alice is a promising tennis player at her early career stages

She needs \$100,000 for equipment, training, traveling to tennis tournaments

She signs up at the platform, builds her profile, signs a contract with the platform; 100,000 tokens (each valued at \$1) are issued

Tokens are sold to investors. Alice receives \$100K, while investors get the rights to 30% of her future income for a fixed period

Alice invests the funds on professional training and participation in events around the world

After a few years, Alice has developed into a professional player earning \$300,000 a year

Of this income, 30% (i.e. \$90K annually) is distributed to token holders via the blockchain platform

Investors receive income (dividends) and can sell tokens, which will fluctuate in value according to income/maturity

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## **3. Prediction Markets**



### Introduction to prediction markets

- **Prediction markets** are platforms for trading on the outcome of future events. They are essentially bets on uncertain future events and for that reason they are also called betting markets. Prices in prediction markets indicate what participants believe the probability of a future event is.
- Consider the following example:
  - It is late August, and you reside in Cyprus for summer vacation with a friend.
  - Your friend notices a few clouds in the sky and predicts that it will rain within the next 24 hours
  - You, knowing that precipitation during August in Cyprus is extremely rare, offer your friend the following bet:
  - If it rains, then you must pay them, and If it doesn't rain, they must pay you a certain amount
  - You are so certain of the outcome that you are willing to match your friends' bet 2:1, betting \$2 for each \$ they bet
- You have essentially created a small and unofficial prediction market on the outcome of the weather
- Large and organized prediction markets (betting markets) operate on much of the same principles
- Besides weather the allow participants to bet on a number of areas ranging from election outcomes to sports.

# The need for prediction markets and decentralized prediction markets

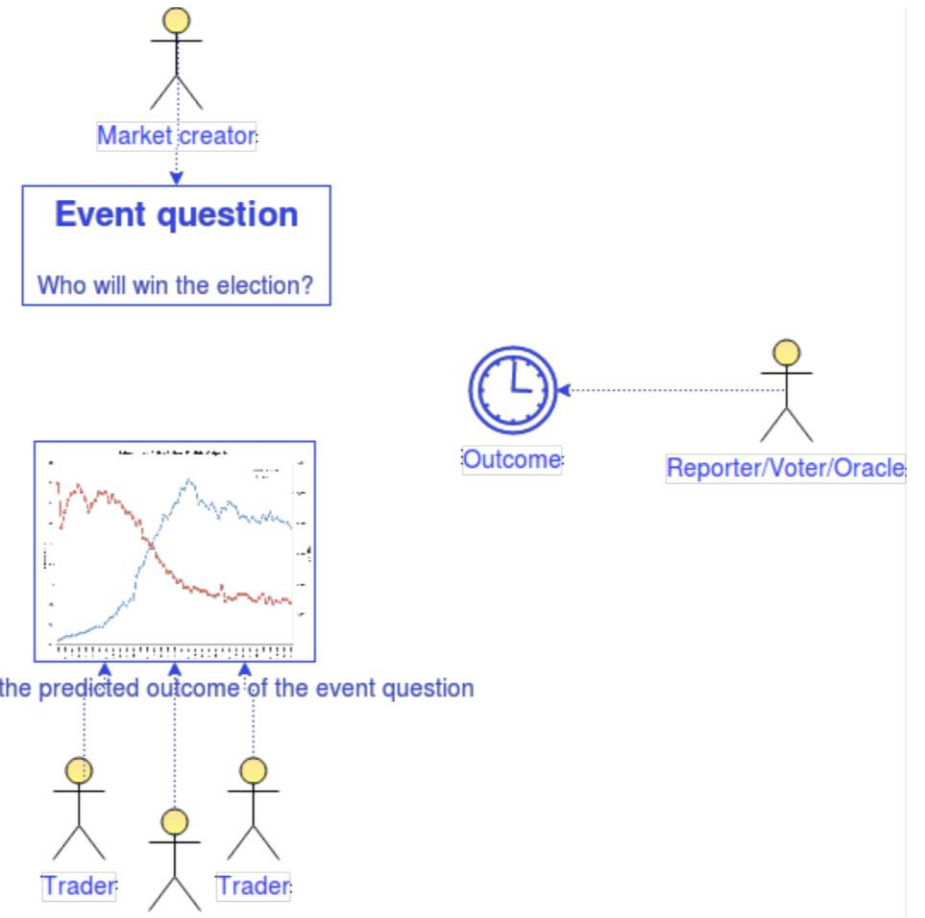
- Participants in prediction markets can leverage their knowledge, and insight to earn money.
- They can also use prediction markets as a novel form of hedge
- Finally, on a bigger scale, prediction markets can be used for estimating the outcome of future events. That is due to a concept known as **the wisdom of the crowds**. This refers to the idea that large groups of people are collectively smarter than individual experts.

Centralized prediction markets have been around for long, there are many reasons for them to become decentralized.

- Disintermediation of central administrators of prediction markets
- Counterparty risks: not requiring parties to trust each other to settle payments or trust a market operator (funds would be moved to an automated escrow, like in smart contracts)
- Limited choice of markets, difficulty of creating new ones in centralized markets
- Reduced costs, as decentralized markets would operate autonomously

# How decentralized prediction markets work

- The principle is similar in most decentralized prediction markets. Therefore, if you understand one, you have enough knowledge to easily follow others.
- The basic **process**:
  - Anyone can start a market about a future event and provide initial liquidity to it (market creator).
  - Individuals who believe they have enough information about the outcome of the event in question, buy shares that reflect their belief (traders).
  - The event is settled by some oracle and payouts to winners are settled automatically (reporter/voter/oracle).





# Augur

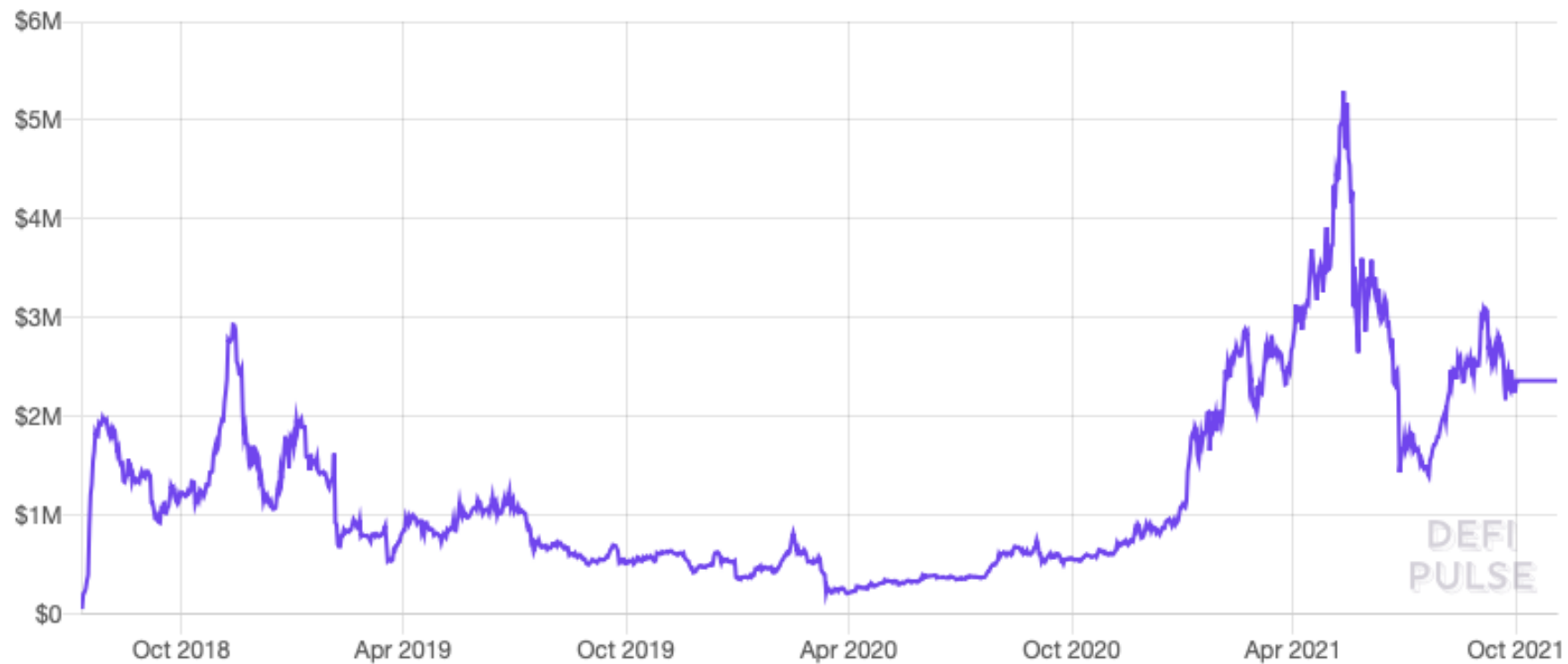
- Augur is a decentralized oracle and peer to peer protocol for prediction markets. It attempts to mitigate the “oracle problem” by relying on a predictive market protocol instead of a singular trusted intermediary or third party.
- Its development began in 2014 as a Bitcoin sidechain, before migrating to Ethereum to benefit from its richer programming capabilities. It raised \$5 million in a crowdfunding campaign in late 2015.
- The key roles in Augur are the following:
  - **Market Creator**
    - creates new markets (bets)
    - places a security deposit that will be forfeited if the outcome can't be determined or for abusing the system
    - is encouraged to provide initial liquidity to the market (by buying shares just like traders)
    - receives “creator fees” from traders
  - **Reporter**
    - asserts the market: what was the actual outcome of the event
    - rewarded for reporting honestly and in time
    - receives “reporting fees”, set dynamically
  - **Trader**
    - buys/sells shares in a market, based on the expectations of the outcome

# Augur TVL

### Total Value Locked (USD) in Augur

[TVL\(USD\)](#) | ETH

[All](#) | 1 Year | 90 Day | 30 Day



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## **4. Conclusion**

### Conclusion

- In this session you have learned about the concept of tokenomics, and how it applies to both the microeconomic and macroeconomic aspect of blockchains
- We have explored the concept of blockchain tokenization. You should now have a basic understanding of how, through tokenization, markets for assets, such as real estate, commodities, and NFT blue chips can become more accessible, transparent, and efficient markets.
- We also defined prediction markets and delineated the main mechanisms and concepts that enable them in the first place.

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## **5. Further Reading**



### Further Reading

- Tokenomics:
  - [An introduction to token economics](#)
  - [Token Supply 101: Fundamentals of Token Supply](#)
  - [ETH Monetary Policy](#)
- Prediction Markets:
  - The details of how it works can be found in: <http://augur.net/whitepaper.pdf>
  - You can access the live version on: <https://app.augur.net/> and try it out.
  - Gnosis Whitepaper: <https://gnosis.pm/resources/default/pdf/gnosis-whitepaper-DEC2017.pdf>
  - <https://blog.gnosis.pm/prediction-markets-2-0-teaser-4ee1cfa3d61f>
- Tokenization
  - [What Is Tokenization in Blockchain?](#)
  - [Real estate tokenization](#)
  - Li, Xuefeng, et al. "Tokenization: Open asset protocol on blockchain." 2019 IEEE 2nd International Conference on Information and Computer Technologies (ICICT). IEEE, 2019.

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<https://discord.gg/r6FrHbsfSJ>





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## Questions?

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