# How is blockchain changing the world of tech

Ganesh Viswanath-Natraj

Warwick Business School

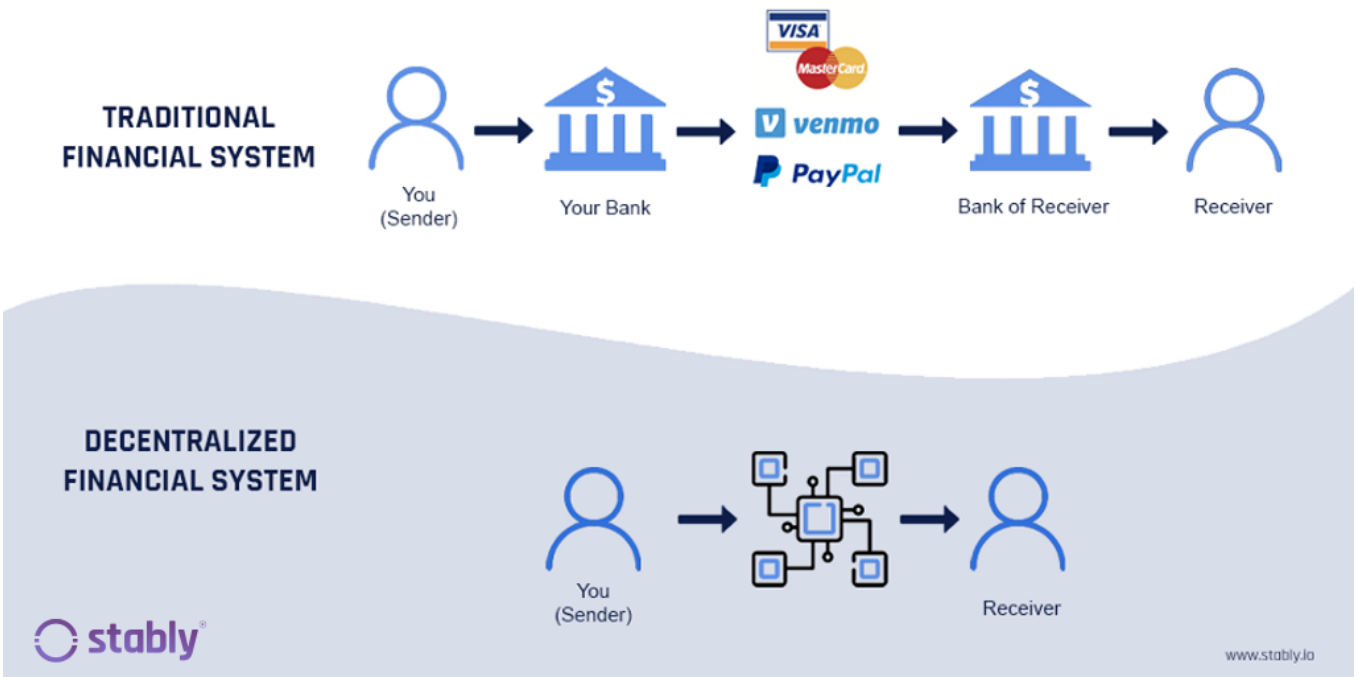
October 27, 2022

# Roadmap of Talk

1. Why use blockchains?
2. Economics of the blockchain
3. Blockchain and DeFi applications
    - Stablecoins
    - Lending protocols
    - Exchanges

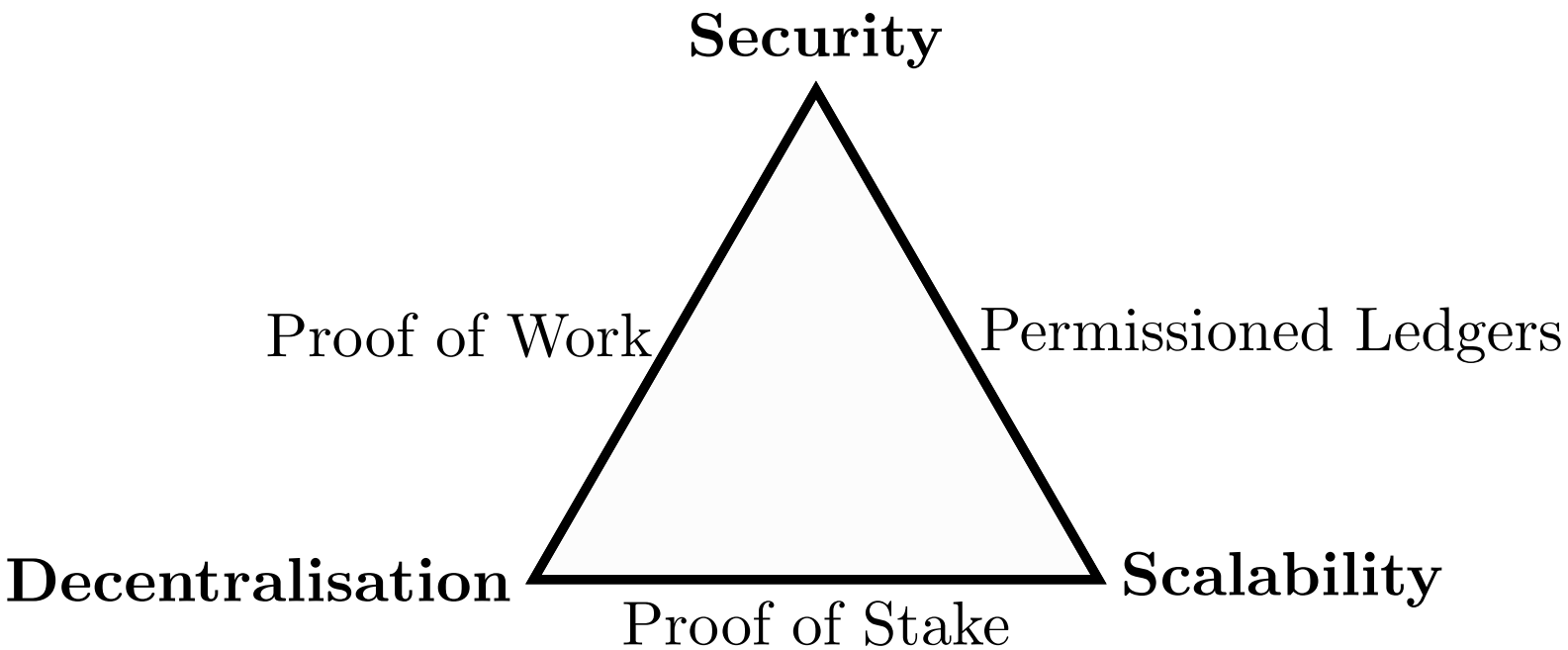
# Blockchain beginnings: Nakamoto (2009)

- Nakamoto (2009) Whitepaper let to creation of Bitcoin: a currency which allows online peer-to-peer payments without a trusted financial intermediary.
- Relies on a system based on cryptographic proof instead of trust.



# Blockchain Trilemma

- Blockchains are a peer-to-peer immutable public distributed ledger of transactions.
- The validation of transactions requires authentication through a consensus by validators, typically called miners.



# Blockchain

There are three predominant types of validating blockchains

1. **Proof of work**: Most common and is system adopted by Bitcoin and most cryptocurrencies. Miners solve complex mathematical puzzle to authenticate next block of transactions and receive a reward.
2. **Proof of stake**: Less computationally intensive. Miners stake tokens to determine which miner authenticates block. Increases scalability but is less secure.
3. **Permissioned**: Restricts number of validators and achieves consensus through a super-majority (eg. two thirds) to authenticate a block.

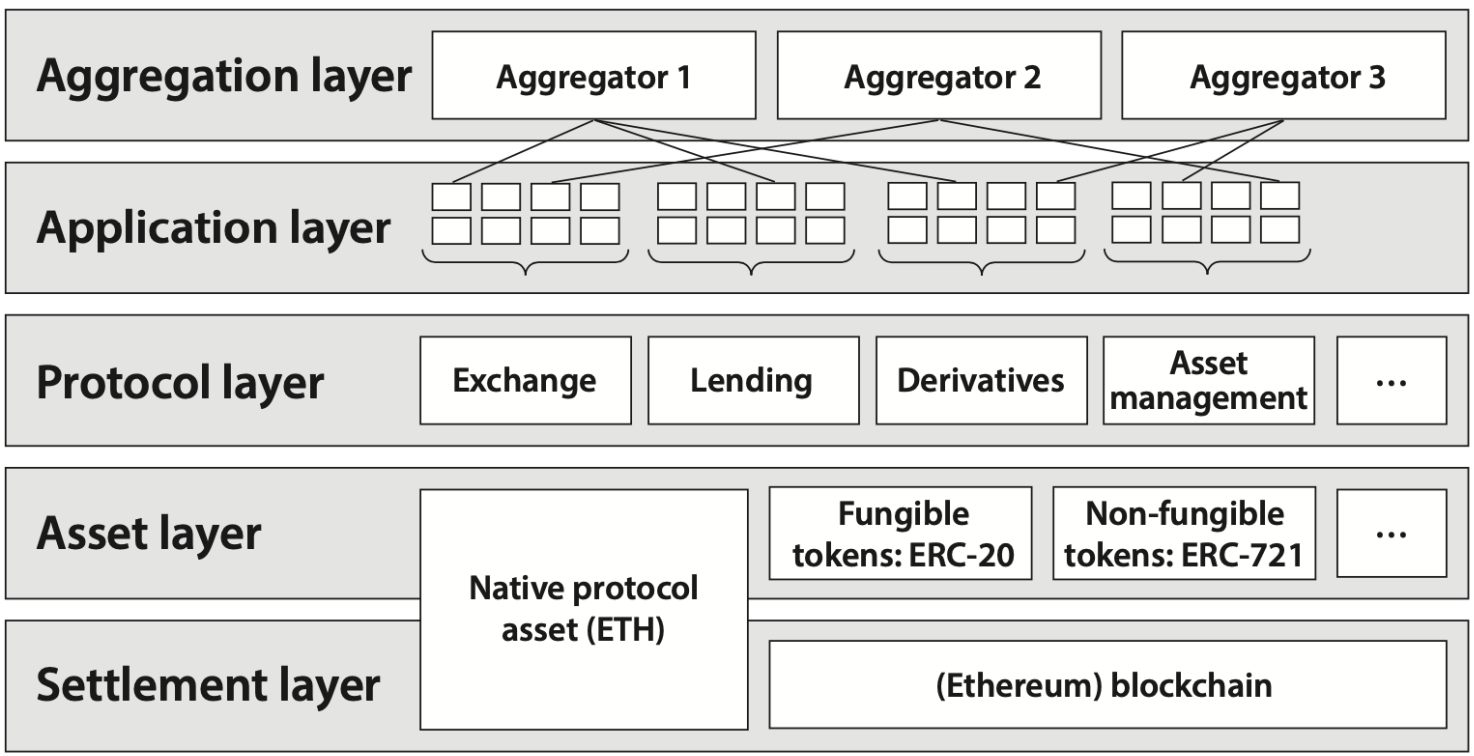
# Proof of Work

# Ethereum Blockchain

- Ethereum is a decentralized, open source, and distributed computing platform that enables the creation of smart contracts and decentralized applications.
- Smart contracts is a set of instructions, written in computer code, that defines the conditions of the contract for each counterparty under different scenarios (default etc).
- Example 1:**ERC-20 tokens**: A standard which provides functions including the transfer of tokens from one account to another, getting the current token balance of an account and the total supply of the token available on the network.
- Example 2: **Liquidation**. A smart contract can be written to auto-execute when your position is leveraged above the limit, by liquidating user collateral and extracting penalty fees.

# Ethereum Blockchain

- Ethereum's smart contract functionality has led to a large network of ERC-20 tokens on the asset layer.
- These tokens are traded on applications in the protocol layer.
- All applications communicate to users via the application layer (web browsers, digital wallets).

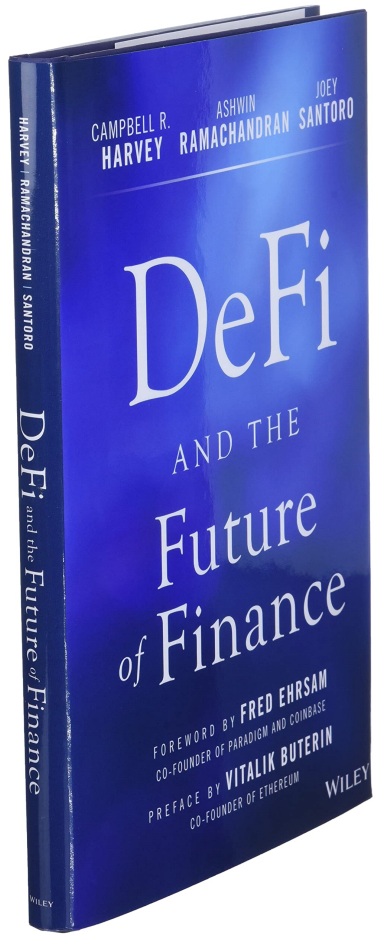


# Future of Blockchains

- **Supply chain**:
  - Increases transparency of downstream (producer $\rightarrow$ wholesaler $\rightarrow$ retailer) by documenting all information on goods exchange on public blockchain.
  - Can generalise to any application which benefits from a public archive (eg. Medical/Insurance records).
- **Central bank digital currency**:
  - Potential benefit of reducing illicit (money laundering) activity.
  - Costs are security of blockchain and trust in government.
- **Decentralised Finance**:
  - In my view, the biggest net benefit of blockchains is in reducing the role of intermediation in financial markets.
  - This is through system of smart contracts, which through programming code allow prices to be algorithmically determined, and regulate system parameters.

# Decentralized Finance

DeFi is a blockchain based form of finance that removes the need for intermediation. Applications include algorithmic exchanges, algorithmic lending and tokenization.

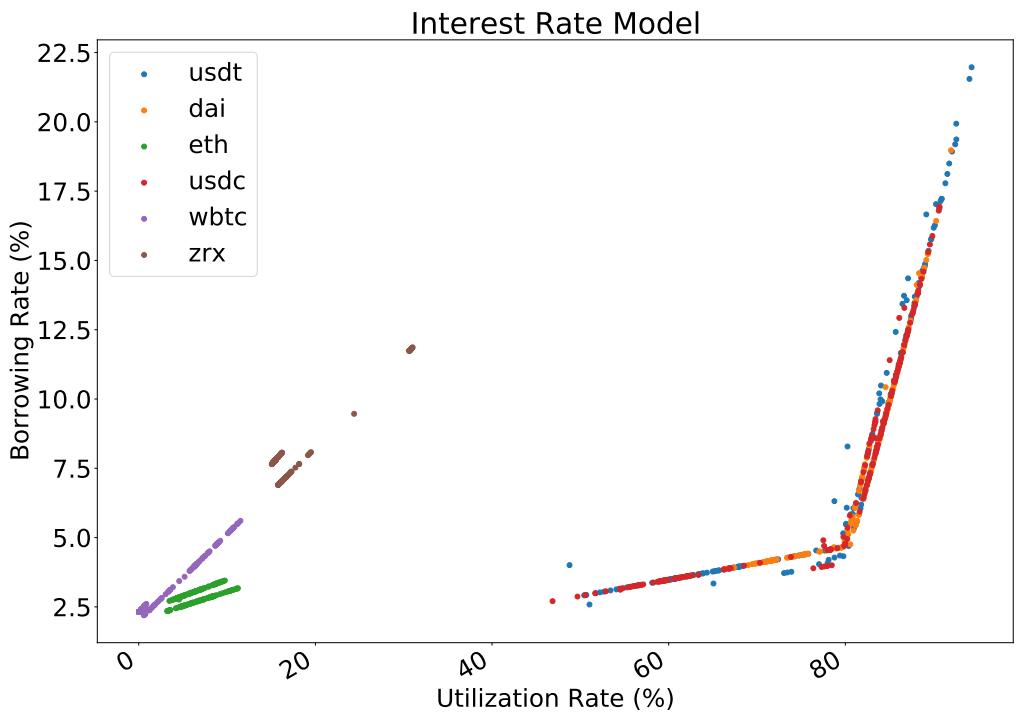



# Stablecoins

- Stablecoins operate on the blockchain and are pegged at parity to the US dollar. Each stablecoin is backed by an external asset, typically dollar reserves and short-term debt.
- **Vehicle currency**: They serve as vehicle currencies for trading crypto assets generally due to a reduction in intermediation costs by operating on the blockchain
- **Use in DeFi applications**: Stablecoins are the building blocks of DeFi and are used as vehicle on Uniswap (DEX) and DeFI lending protocols to earn high savings rates (eg. Compound)
- **Stablecoins and emerging markets**: Stablecoins have a strong use case in emerging markets with high inflation and weak macroeconomic fundamentals. It can also address financial inclusion by providing a savings vehicle for the unbanked.

# Lending Protocols

- Users can lend and borrow multiple assets through system of collateralised lending.
- Interest rates are determined through algorithms, and are based on utilisation, which measures the fraction of currency deposits that is borrowed.



# DeFi vs Traditional Markets

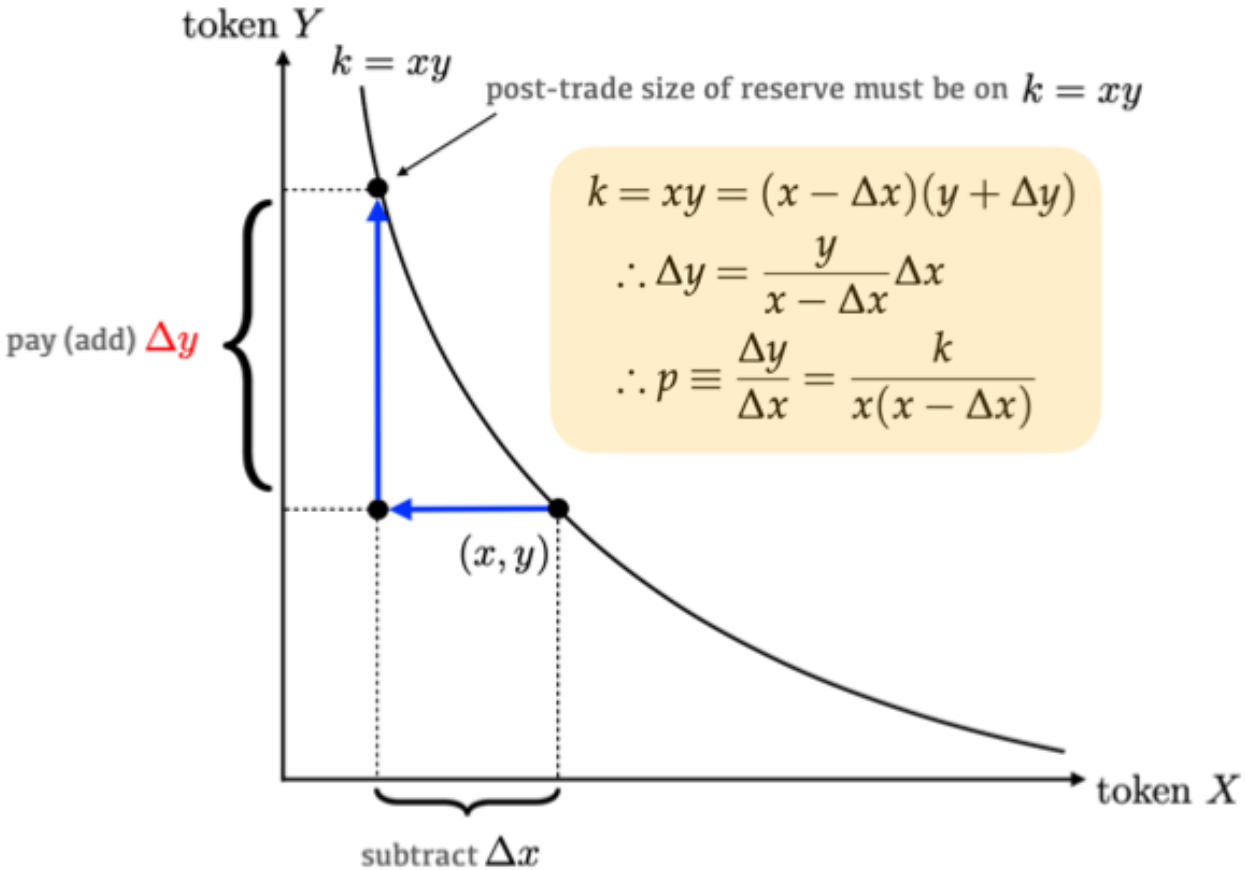
- Can DeFi lending protocols challenge traditional financing as we know it?
- Banks typically lend to customers based on **credit score**.
- Banks are more capital efficient, for example to lend a mortgage a customer only requires to post a deposit that is 15% of the mortgage loan.
- In contrast, DeFi lending protocols require over-collateralisation to insure against default. Smart contracts enforce automatic liquidation of debt when collaterisation falls below a threshold.
- Trade-off between **over-collateralisation** and **scalability** of DeFi lending protocols. This is a limiting factor in banks adopting over-collateralised lending!

# Decentralized Exchanges

- Decentralised exchanges (DEX) such as Uniswap allow investors to buy and sell tokens in a liquidity pool at an algorithmically determined price.
- Advantages of DEX:
  1. DEX do not have to rely on the service of professional market makers, individual investors can supply liquidity in DEX market.
  2. In order to trade in CEX you have to transfer your tokens to your account at CEX and it is exposed to counterparty risk of the exchange.
  3. On CEX you can only exchange tokens that are "listed". In DEX there is more possibilities to exchange across different tokens.

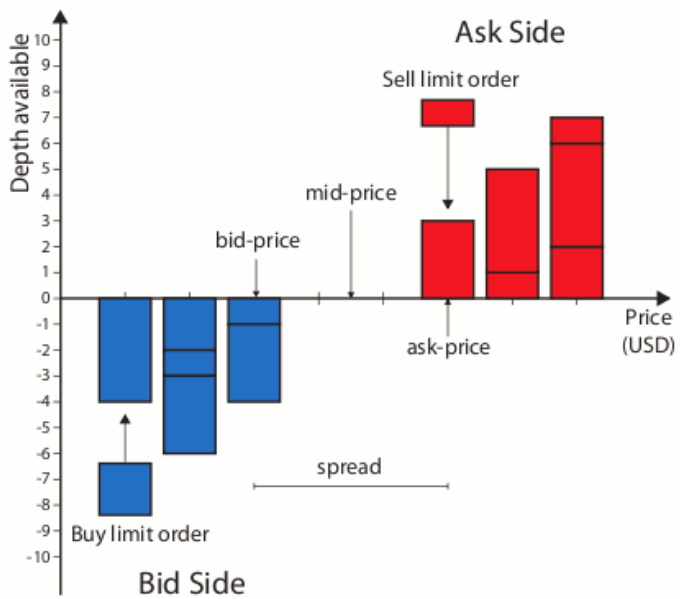
# Automated Market Maker Algorithm

Price of token Y in terms of X is derived via a constant product algorithm $k = xy$



# DeFi vs Traditional Markets

- Traditional markets (eg. New York Stock Exchange) and centralised cryptocurrency exchanges (eg. Binance) use a **limit order book**.
- Limit orders specify the price at which the trader is prepared to buy (bid) or sell (ask) the security. Market orders are executed at the best bid or ask.
- Market-maker supplies liquidity and typically charge bid-ask spreads in matching buyers to sellers.



# Conclusions and Food For Thought

We have seen an alternative way of organizing finance. However many burning questions remain:

1. Will blockchain technologies replace traditional financial markets as we know it?
2. Even if it is truly decentralized, what other sources of risk do blockchain technologies bring?
3. How can we regulate this sector in an efficient way without being disruptive?

# Thank You!

- Feel free to reach out to me at ganesh.viswanath-natraj@wbs.ac.uk or check out the media section of my webpage `https://ganeshvnatraj.netlify.app/` for more references.
- Additional References:
- Blockchain and DeFi Summary
- Proof of Work vs Proof of Stake
- Decentralised Finance Lecture Notes: Cam Harvey Duke