



Cryptocurrency, Blockchain, and Their Governance Implications

A Lecture Prepared for
The Institute for Corporate Governance (ICG)
at Kelley School of Business

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Lecture Outline

- **Topic 1: Cryptocurrency and governance**
- **Topic 2: Pros and cons of decentralized governance**
- **Topic 3: Role of literacy, disclosure, and regulation**
- **Q&A**

Cryptocurrency and Governance

Sam Bankman-Fried's FTX had the corporate governance of a college fraternity, congressman says

New FTX Chief John Ray: 'Never in My Career Have I Seen Such an Utter Failure of Corporate Controls'



Cryptocurrency and Governance

- Cryptocurrency was born in the wake of the 2008 financial crisis to address governance failures in centralized control of money.
 - **Bitcoin**, the first cryptocurrency, was introduced by “Satoshi Nakamoto” in 10/2008 via a Cypherpunk mailing list (Nakamoto 2008)
 - Cypherpunks: individuals advocating for social and political changes through use of cryptography
 - Message in the genesis block: “*The Times 03/Jan/2009 Chancellor on brink of second bailout for banks.*”

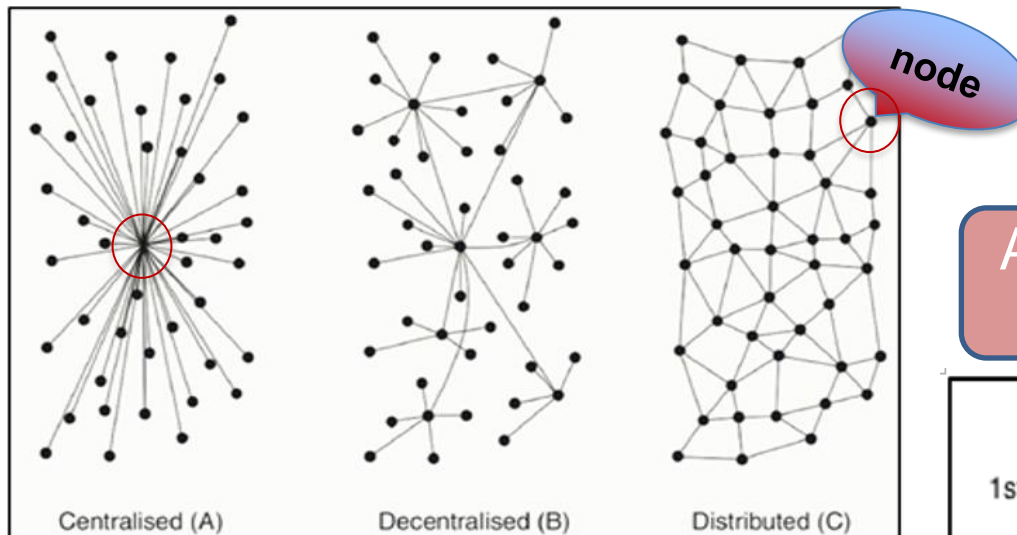


Cryptocurrency and Governance

- Governance is the system by which entities are directed and controlled, and most governance challenges boil down to **incentives** and **information**.
- Cypherpunks perceive the governance challenges in fiat currencies and traditional financial institutions to be “**centralized control**” and “**information obscurity**.”
 - Nakamoto: “*I hope it's obvious it was only the centrally controlled nature of those systems that doomed them.*”
 - A popular slogan: “freeing the world’s information”
- Their proposed solutions are therefore “**decentralized governance**” and “**information transparency**.”
 - Nakamoto: “we're trying a decentralized, non-trust-based system.”

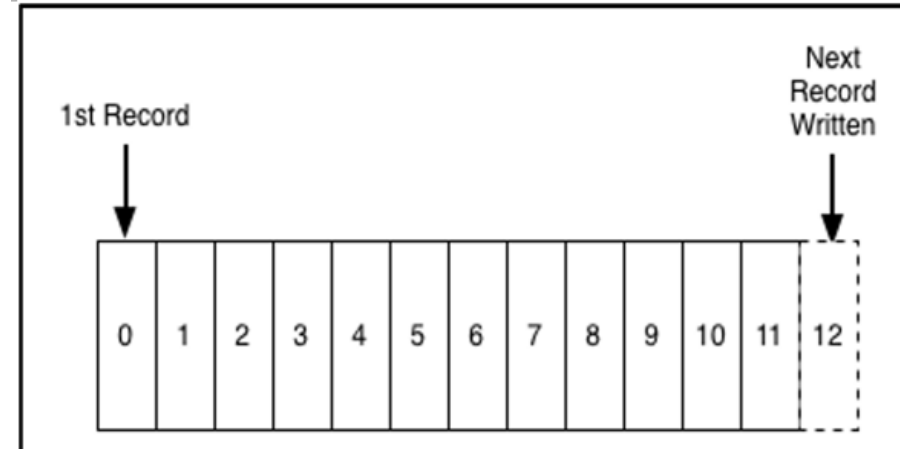
Cryptocurrency and Governance

- Cryptocurrencies are digital, **decentralized** currencies that rely on cryptography for security and **blockchain** for recording transactions.



Auditability and immutability ->
Information Transparency

No central point of failure ->
Decentralized Governance

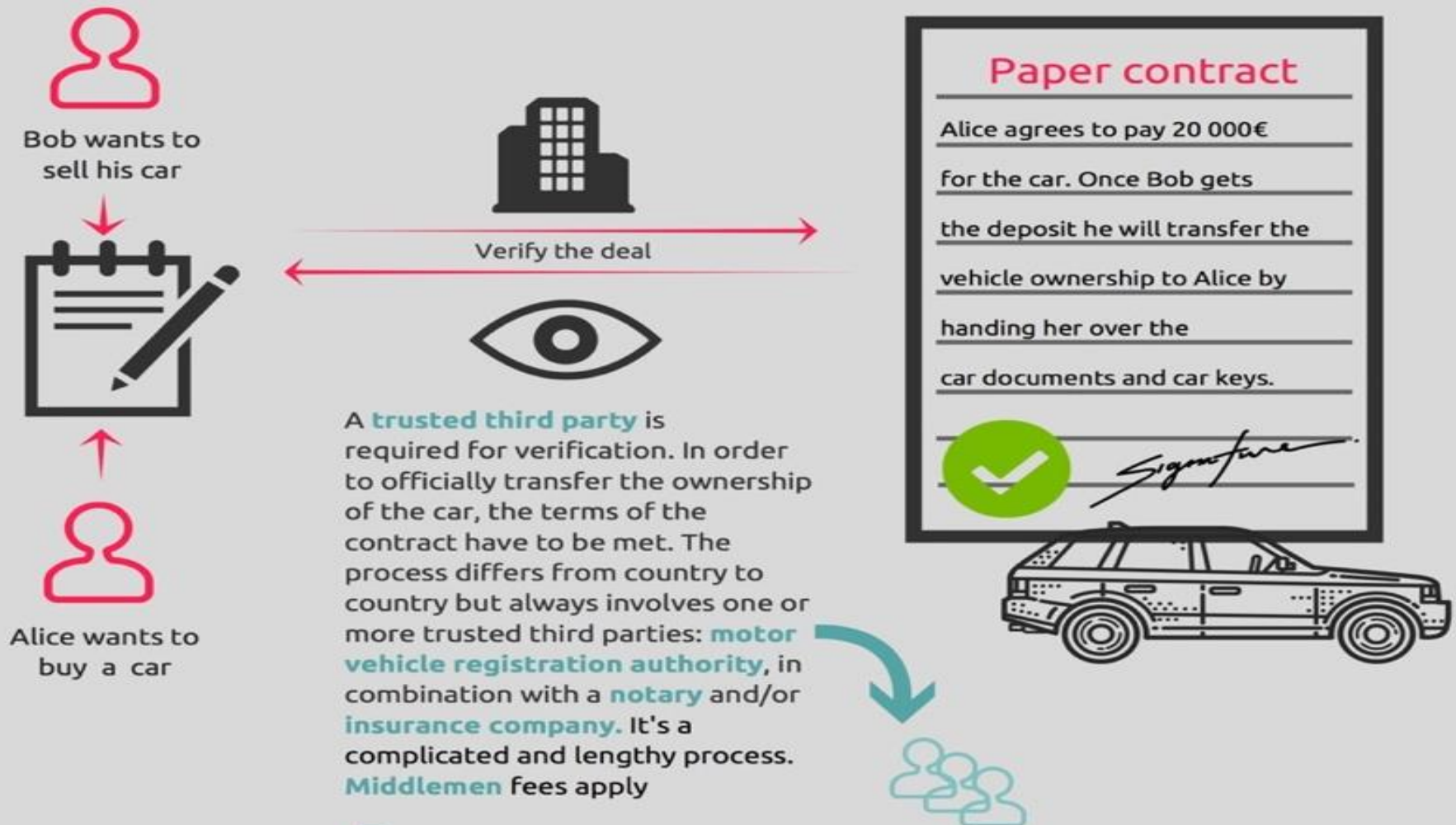


Cryptocurrency and Governance

- Ethereum, introduced in July 2015, was created to be “a programmable blockchain” that allows developers to build and publish smart contracts.
 - A smart contract is a computer protocol that is programmed to execute the terms of a contract (i.e., automated if-then statements)
 - e.g., an ATM
 - dApps are applications that are run on a decentralized system through the use of smart contracts (Johnston et al. 2014)
 - User controlled, no central authority, and no third-party intervention
 - All information stored on a publicly accessible blockchain
- The use of dApps implies fewer agency conflicts, less contracting cost, and better information transparency

Traditional Contracts

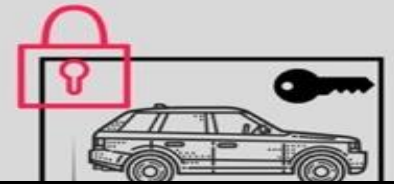
Traditional Used Car Sale



Bob leaves his car and car key in a garage locked with a smart contract controlled smart lock. The car has its own blockchain address (public key) **13849Z** stored on the blockchain



2



Bob wants to sell his car. He identifies himself with his blockchain address (public key) **757382** and uses a smart contract to define the terms of the sale signing it with his **private key**

1



```
<Smart contract>
<contract>
IF 20 000€ were sent to
my account number 757382
then automatically transfer
car ID 13849Z as well as grant
smart lock access to the
account from which the
money has been transferred
</contract>
```

Smart Contracts

The smart contract is verified by each node on the blockchain network checking if Bob is the owner of the car and if Alice has

4

If the network agrees, that all conditions are true, Alice automatically gets the **access code** to the smart garage lock. The blockchain registers Alice as the new owner of the car. Bob has **20 000€** more in his account, and Alice **20 000€** less

5

The smart contract is accessible from a web browser. Traditional online services can use smart contracts in the backend

Alice wants to buy a car. She finds Bob's car listed on the Internet. She signs the contract with her **private key** transferring **20 000€** from her blockchain address (public key) **389157** to Bob's blockchain address **757382**

3



2

6

Alice can now pick up her car by unlocking the smart lock with her **private key**



Used Car Sale with a dApp

Decentralization and Blockchain Pros

- Settings where trust is highly valued because the removal of central agencies and the use of blockchain greatly help reduce the chances for tampering, collusion, or fraud.
 - **Incentives are not aligned: e.g., voting**
 - Vote counting is made easier: no double or fake votes
 - Hacking and tampering are difficult
 - The Thai Democrat Party held its primary election through a blockchain-based voting system in November 2018

Decentralization and Blockchain Pros

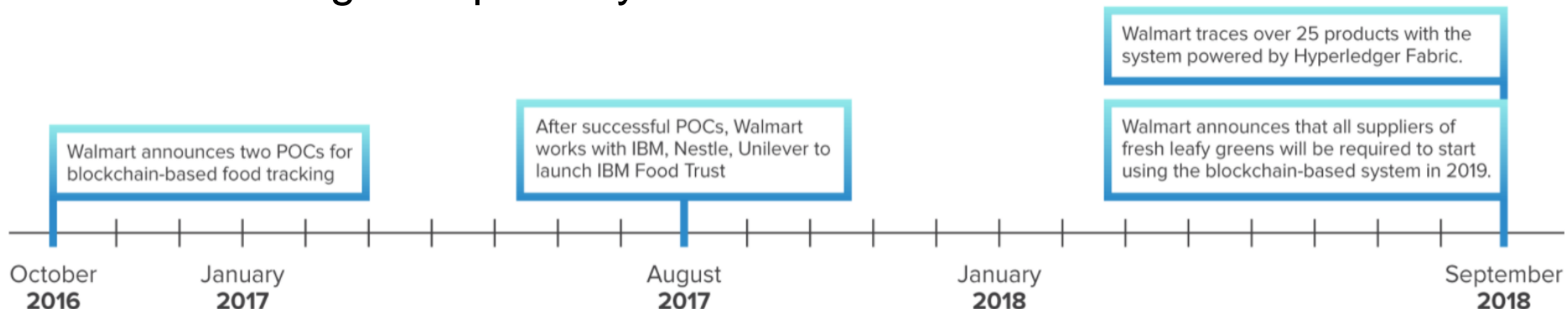
- Settings where trust is highly valued because the removal of central agencies and the use of blockchain greatly help reduce the chances for tampering, collusion, or fraud.
 - **Misincentives: e.g., auditing, provenance**
 - Blockchain-based auditing in Taiwan: auditors and banks perform confirmation via blockchain
 - Blockchain solutions to root out fake or blood diamonds
 - Verify provenance: origin, characteristics, craftsmanship, chain of ownership, and sustainability credentials
 - “*We aim to address pain areas in the industry, which include assurance, trust and transparency*” – CEO of Genesis Block

Decentralization and Blockchain Pros

- Settings where efficient information sharing is needed among multi-party transactions to help avoid exhaustive reconciliation that often takes days or even months.
 - **HSBC's use of blockchain for letter of credit transactions**
 - Reduce the processing time from 5-10 days to <24 hours
 - **Supply chain management: e.g., global shipping industry, global food supply**

Decentralization and Blockchain Pros

- Food safety is critical to Walmart but tracking food is a labor intensive, costly, and lengthy task
 - 2 months to identify the contaminated peanut paste for the 2008 outbreak and linked to over 4000 products
- Walmart/IBM Food Trust
 - Optimizing supply chains: 7 days versus 2.2 seconds
 - Reducing food loss and waste (1/3 of all food produced)
 - Enabling transparency

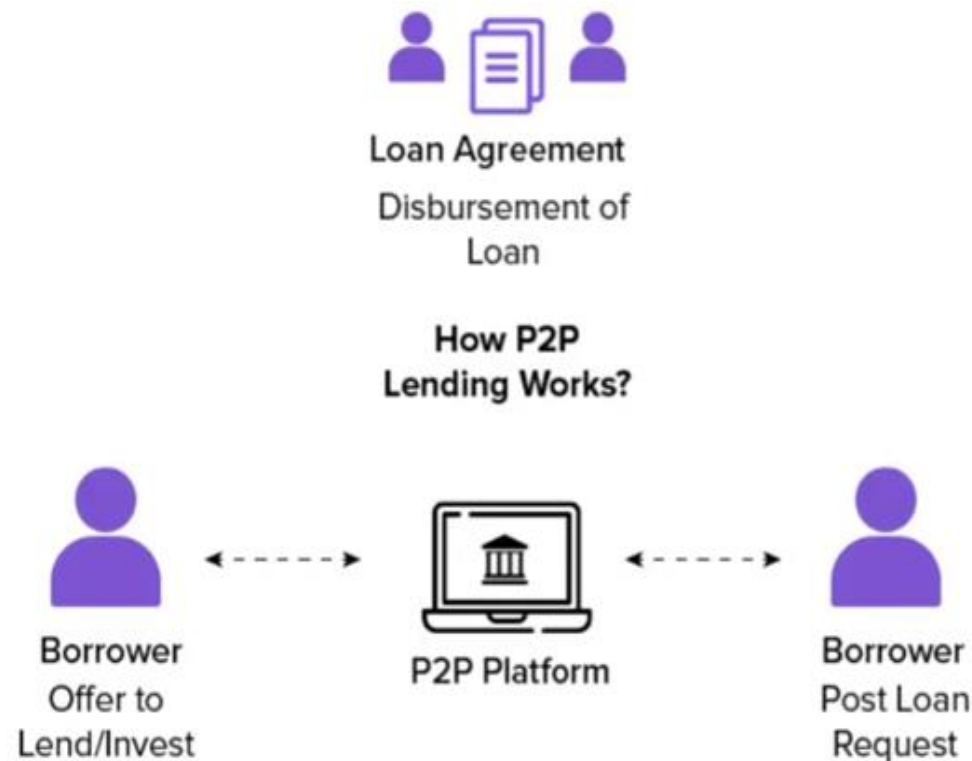


Decentralization and Blockchain Pros

- Settings where getting rid of middlemen is desired as it can remove layers of agency issues and reduce cost.

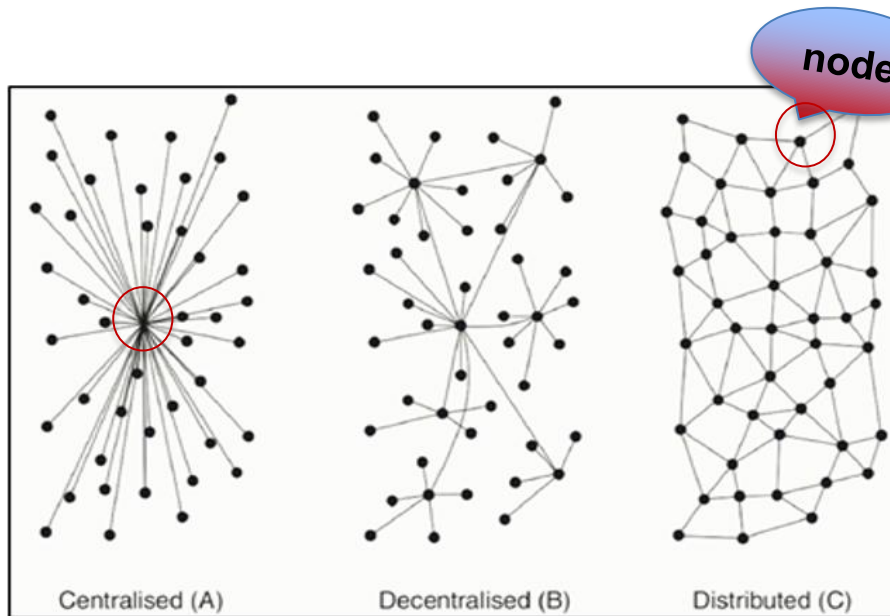
- **DeFi lending**

- No need to involve third parties
- Lenders earn 100% of their interest as there's no intermediary to pay and have more control over loans.
- Borrowers have more say in terms of interest paid as well as their time to pay it.



Decentralization and Blockchain Cons

Decentralization is costly as removing central agencies necessitates a consensus mechanism



How do we achieve consensus?

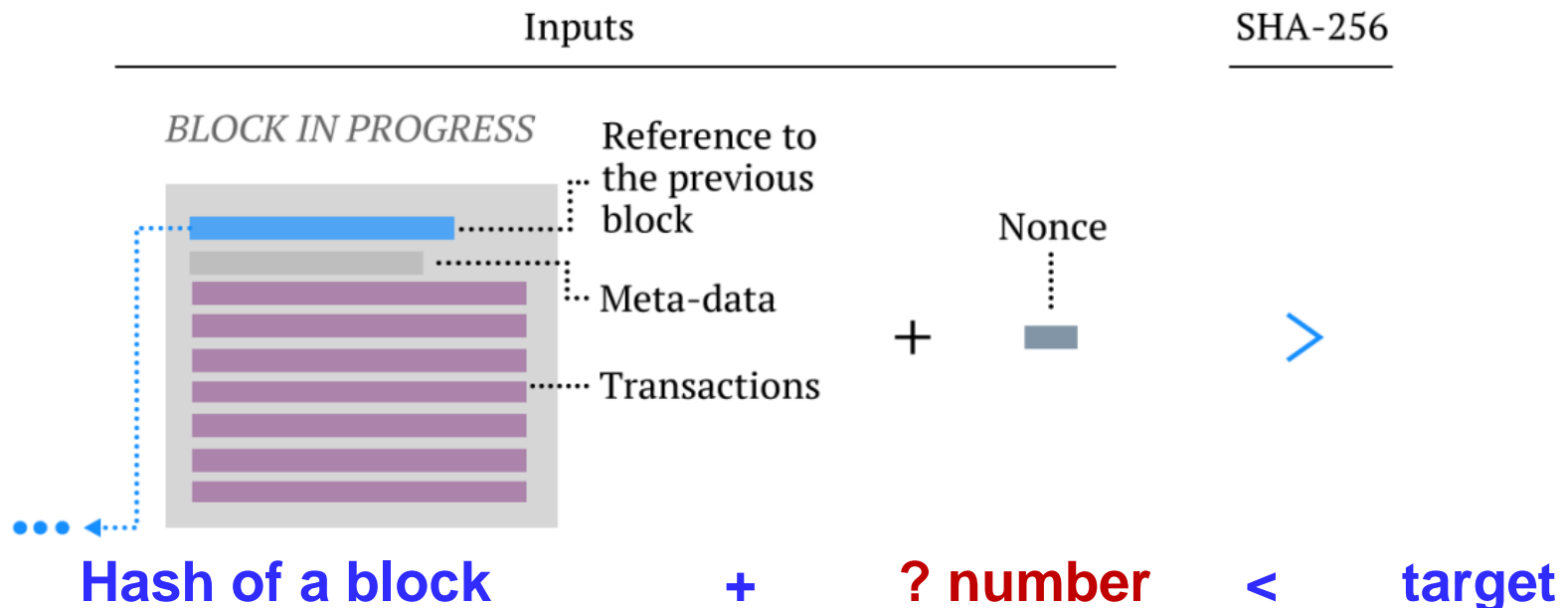
- Who creates new bitcoins?
- Who determines which transactions are valid?
- Who updates the ledger of transactions?

Answer in BTC:

- **Proof-of-work** (“mining”)

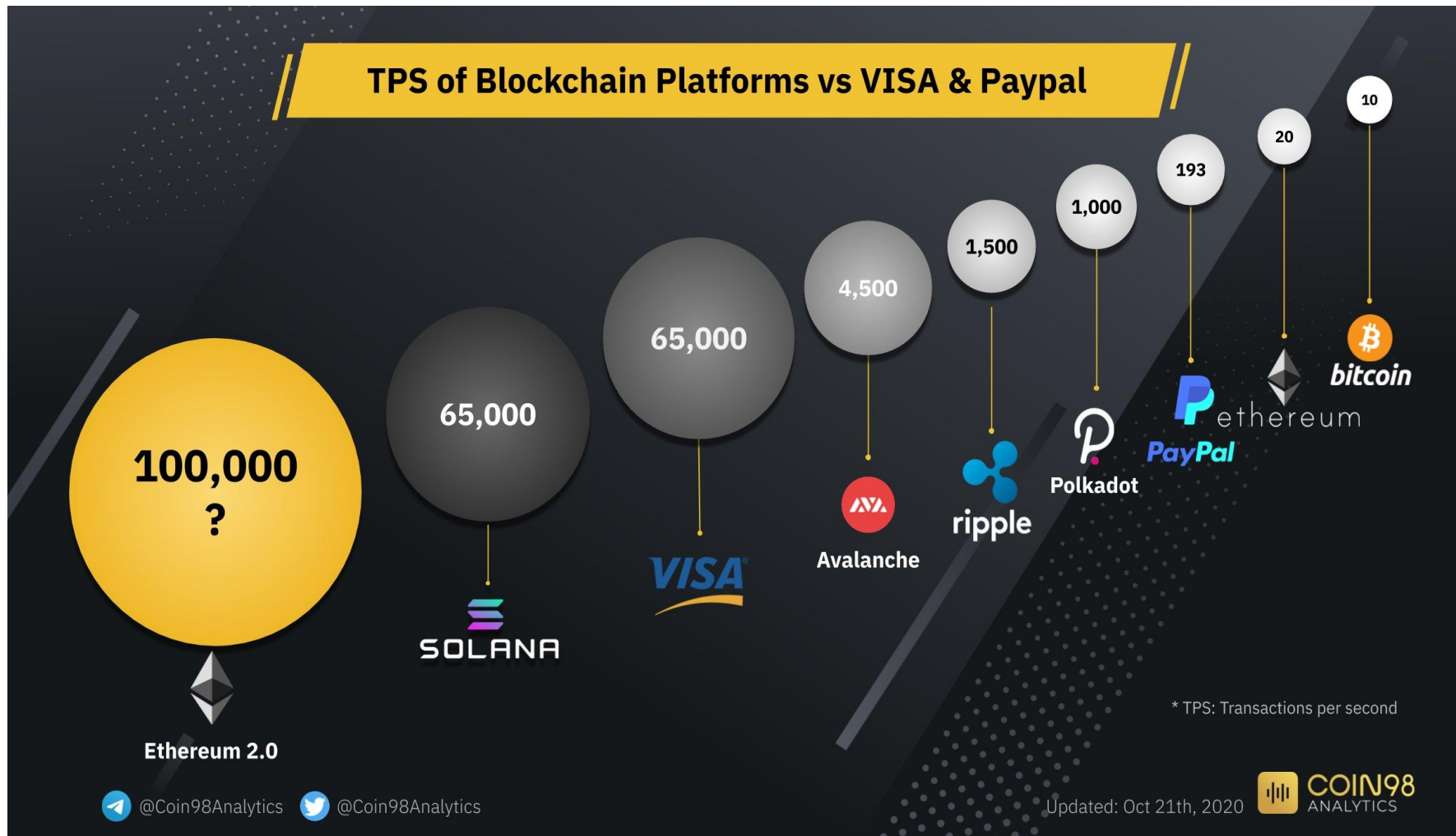
Mining

- **Proof-of-Work (“mining”)**: the protocol that Bitcoin uses to generate new coins, verify new transactions, and update the ledger.
 - Mining is the process of solving a mathematical puzzle
 - Mining is the key to BTC’s success as a cryptocurrency by giving miners economic incentives (block rewards and transaction fees)
 - Very costly but it’s also the necessary evil



Decentralization and Blockchain Cons

Decentralization is also slow

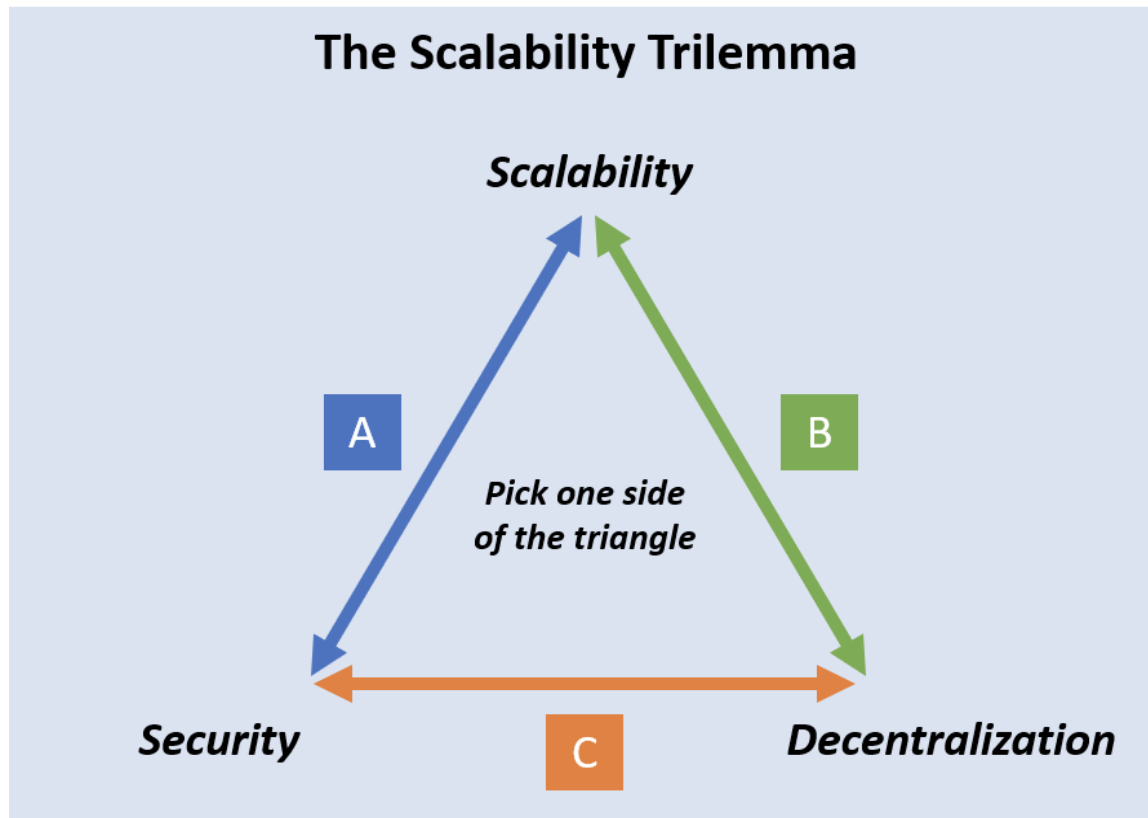


Decentralization and Blockchain Mixed

- Fuzzy line between decentralization and centralization as decentralization is often not sustainable in equilibrium
 - Mining was supposed to be decentralized but is highly centralized now (**Not Satoshi Nakamoto's idea!**)
 - Centralized mining provides higher risk-adjusted profits: Cong, He, and Li (2018)
 - Mining units are more valuable in pools: Leonardos, Leonardos, and Pilouras (2021)
 - Mining is competitive by design: Alsabah and Capponi (2019)
- Most decentralized cryptos are now traded on centralized exchanges: e.g., Binance, FTX, Coinbase

Decentralization and Blockchain Mixed

- Fuzzy line between decentralization and centralization as the costs of decentralization often don't justify the benefits.
 - Particularly salient in enterprise blockchain applications



Decentralization and Blockchain Mixed

- Fuzzy line between decentralization and centralization as the benefits of decentralization are sometimes best attained when a social planner is present to coordinate.
 - Decentralized governance is fundamentally inconsistent with the existence of a social planner
 - e.g., voting
 - Individual entities cannot internalize externality so it is difficult to settle on who should pay for the infrastructure or how to split costs
 - e.g., pilot blockchain-based auditing in Taiwan

Decentralization and Blockchain Mixed

- The interplay between centralized and decentralized governance
 - BTC was invented as a decentralized solution to solve failures in centralized governance.
 - Paradoxically, central intervention is sometimes needed to solve failures in decentralized governance e.g., DAO hack in 2016

Decentralization and Blockchain Mixed

- Is information better in decentralized governance?
 - Technology to achieve decentralized governance is hard

ACC	CyberCents	IKP	MPTP	Proton
Agora	CyberCoin	IMB-MP	Net900	Redi-Charge
AIMP	CyberGold	InterCoin	NetBill	S/PAY
Allopass	DigiGold	Ipin	NetCard	Sandia Lab E-Cash
b-money	Digital Silk Road	Javien	NetCash	Secure Courier
BankNet	e-Comm	Karma	NetCheque	Semopo
Bitbit	E-Gold	LotteryTickets	NetFare	SET
Bitgold	Ecash	Lucre	No3rd	SET2Go
Bitpass	eCharge	MagicMoney	One Click Charge	SubScrip
C-SET	eCoin	Mandate	PayMe	Trivnet
CAFÉ	Edd	MicroMint	PayNet	TUB
Checkfree	eVend	Micromoney	PayPal	Twitpay
ClickandBuy	First Virtual	MilliCent	PaySafeCard	VeriFone
ClickShare	FSTC Electronic Check	Mini-Pay	PayTrust	VisaCash
CommerceNet	Geldkarte	Minitix	PayWord	Wallie
CommercePOINT	Globe Left	MobileMoney	Peppercoin	Way2Pay
CommerceSTAGE	Hashcash	Mojo	PhoneTicks	WorldPay
Cybank	HINDE	Mollie	Playspan	X-Pay
CyberCash	iBill	Mondex	Polling	

Decentralization and Blockchain Mixed

- Is information better in decentralized governance?
 - Explaining the technology is also hard
 - Satoshi Nakamoto himself could not come up with a Bitcoin's description for general folks: *“Sorry to be a wet blanket. Writing a description for this thing for general audiences is bloody hard. There's nothing to relate it to.”*
 - Does it matter if a technology has the potential to enhance information transparency if most don't understand it? -> **Information uncertainty**
 - Technology failures and fraud: DAO attack, ICO collapse, Terra USD crash, rug pulls, FTX

Role of Literacy

- Yermack (2017a): Corporate Governance and Blockchains
- Yermack (2017b): Smart Contracts and Blockchains
- Harvey, Ramachandran, and Santoro (2021): DeFi and the Future of Finance
- Harvey et al. (2022): An Investor's Guide to Crypto
- And much more needed...

Role of Regulation

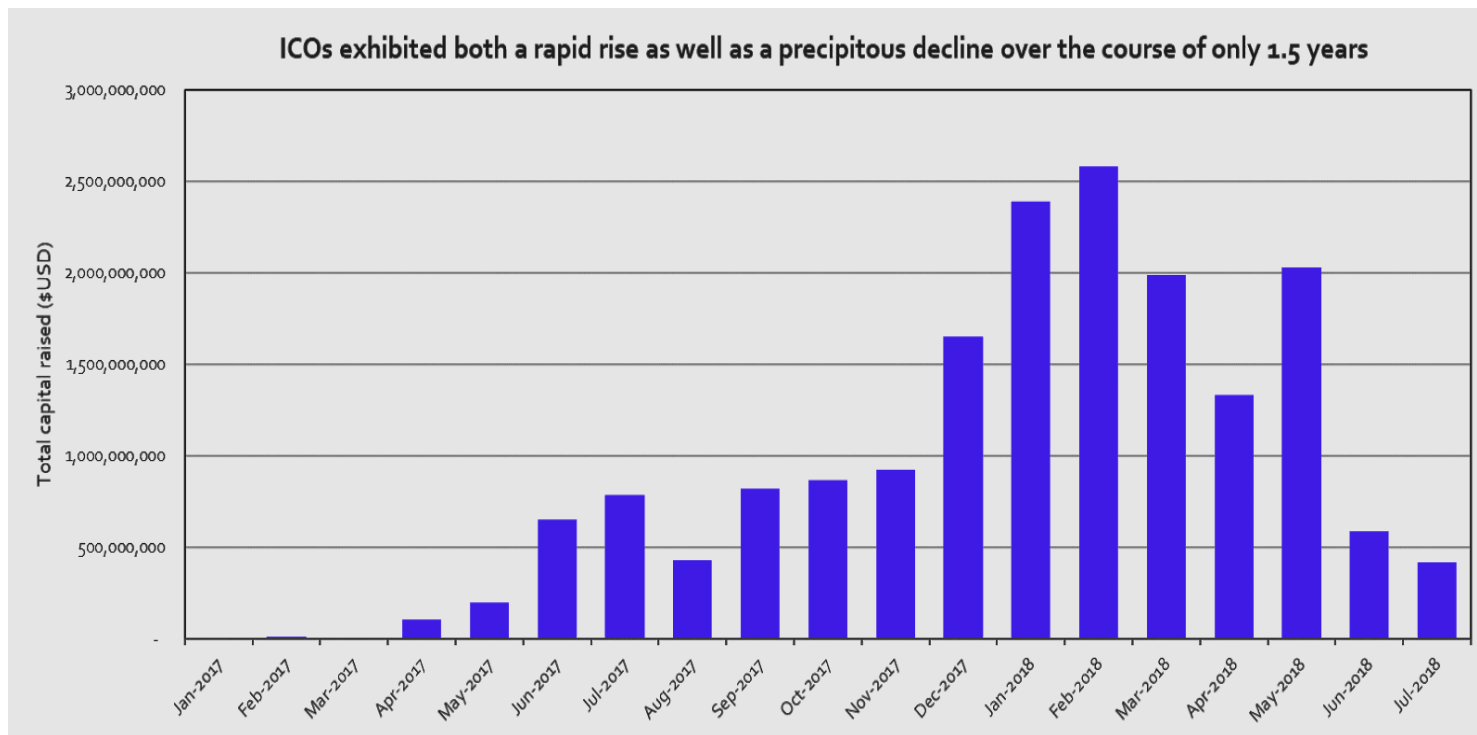
A lot of catching up to do...

- Key issue at the federal level is what asset class best fits cryptocurrencies and which agency has jurisdiction.
 - Treasury: cryptocurrencies are either replacements of or threats to fiat currencies
 - SEC: securities
 - CFTC: commodities
 - spot ETFs vs. future ETFs
- Regulations under development
 - President Joe Biden signed an executive order in 2022/3
 - WH released the first-ever regulatory framework in 2022/9
 - The Digital Commodities Consumer Protection Act of 2022
- Reactionary regulations can be optimal (Fang et al. 2022)

Role of Disclosure

Disclosure in the crypto space is sporadic at best...

- ICO disclosures: Zetsche et al. (2018); Bourveau et al. (2021)



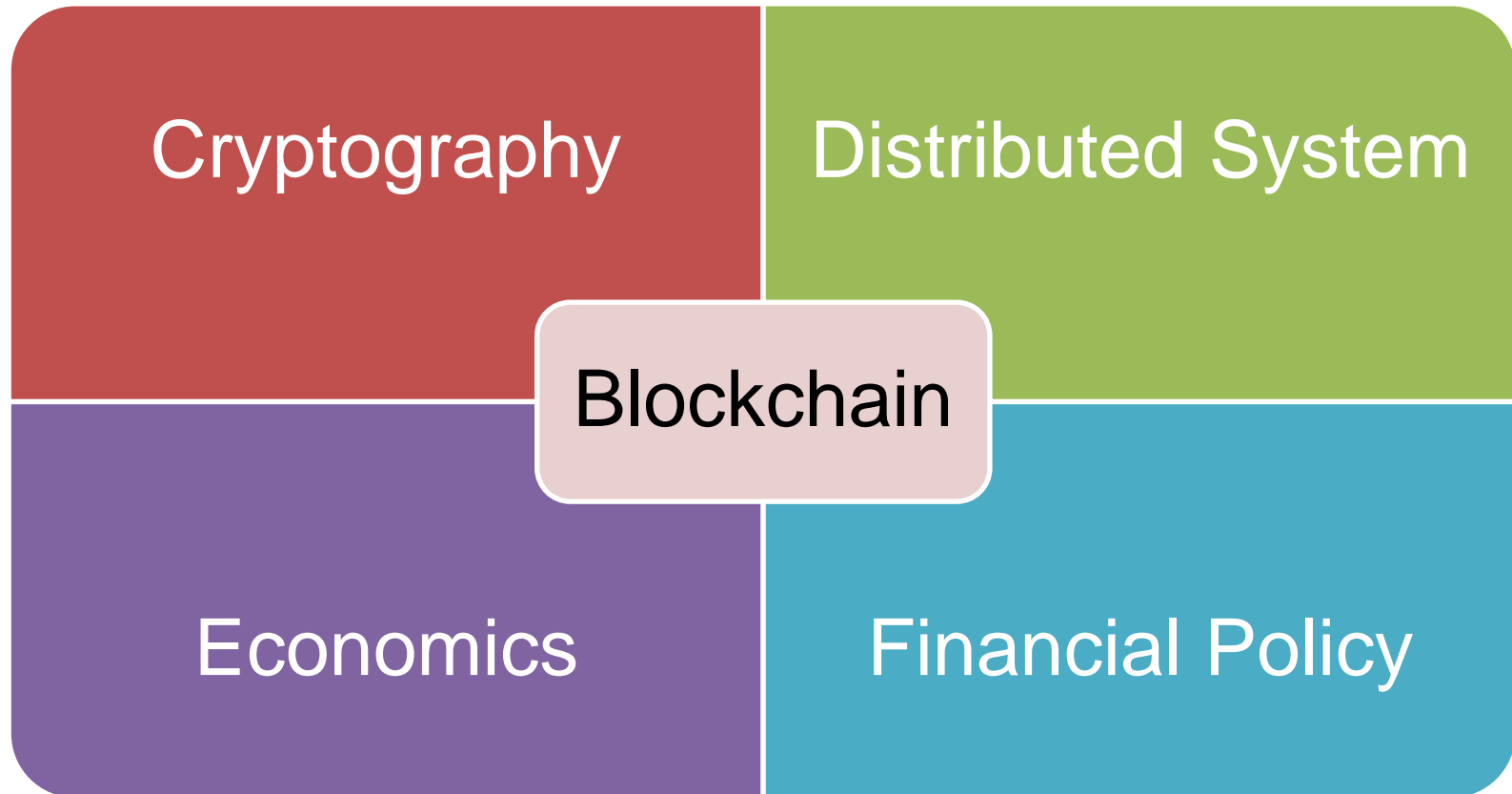
- Proof of reserves to avoid crypto exchange run

Role of Disclosure

Very little accounting guidance...

- Non-authoritative guidance from Big 4 and AICPA in 2018-2019 that crypto holdings should be accounted for as intangible assets
- Investors and analysts struggle to value firms with material crypto holdings and call for authoritative guidance
- FASB requested input on digital asset accounting in 2021 and recently reached a tentative decision that would require fair value accounting for crypto holdings
- Anderson et al. (2023) find significant variations in crypto accounting and show that fair value accounting may be a challenge for illiquid crypto assets

Conclusion



Conclusion

- Cryptocurrency has a lot to do with governance.
 - It was created to address governance failures associated with **centralized control** and **information obscurity**.
 - Its architecture intends to offer **decentralized governance** and **information transparency**.
- Decentralized governance has pros and cons.
 - **Pros:** improve trust, facilitate information sharing, and get rid of middlemen
 - **Cons:** consensus mechanism is often costly and slow
 - **Mixed:** the fuzzy line between centralized and decentralized governance, the information uncertainty of technology
- Much work to be done
 - Literacy, regulation, disclosure