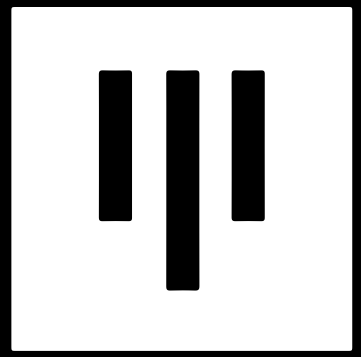

PANTERA

STATE OF BLOCKCHAIN

Agenda

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Decentralized Finance :: Statistics

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Decentralized Exchanges

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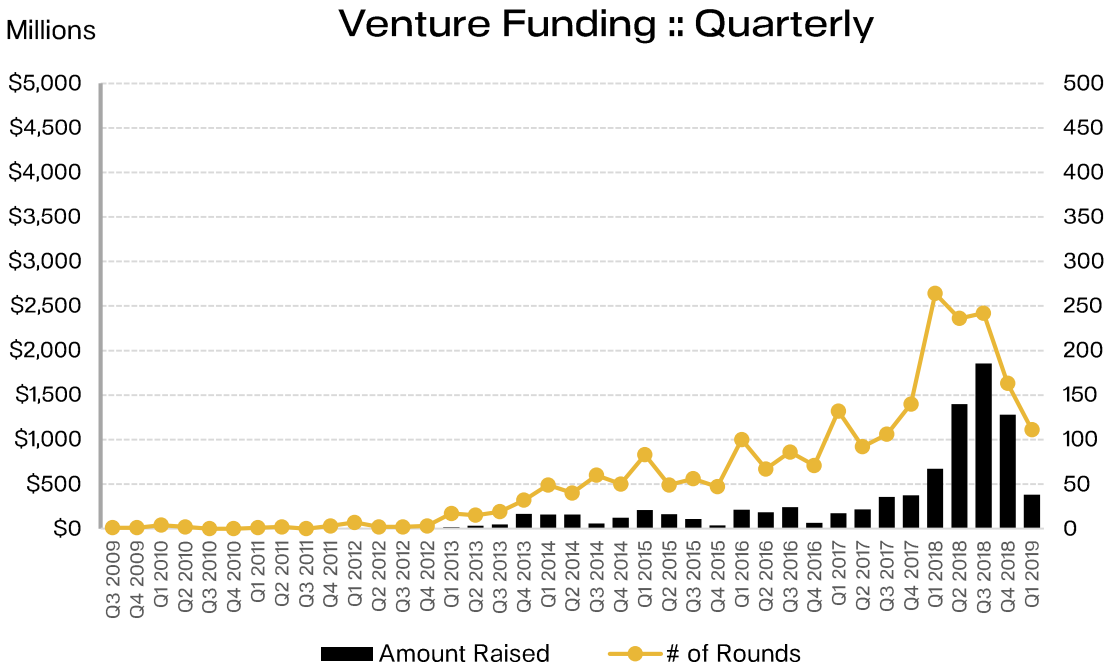
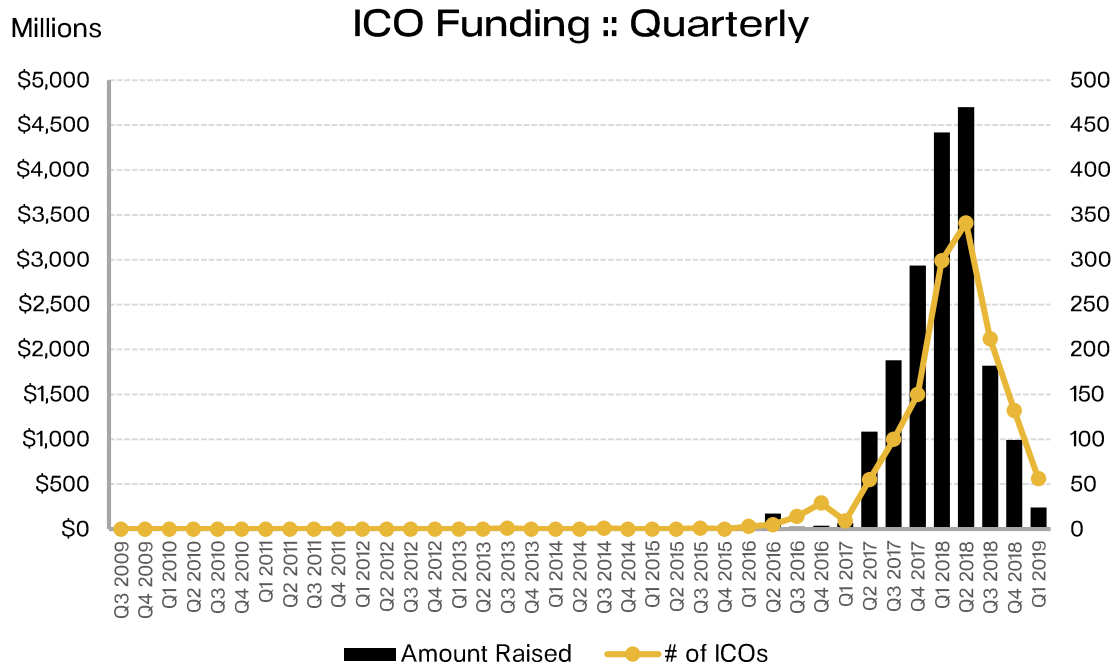
dApp Platforms :: Overview

Blockchain Funding (1 of 2)

- Venture has shown steady growth over time relative to ICOs
- ICOs exploded in 2017 and are returning to "normal" levels
- Fewer ICOs but higher quality projects

	# of Deals	Amount Raised
Venture	2355	$8.7b
ICO	1408	$18.4b

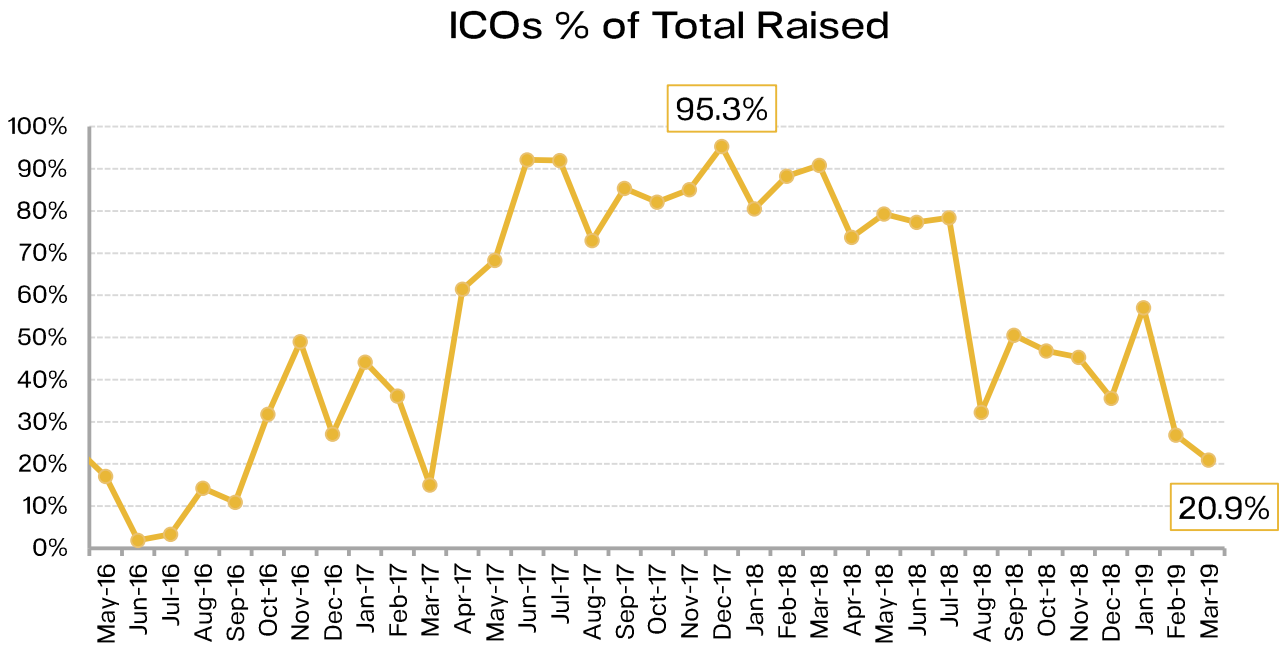


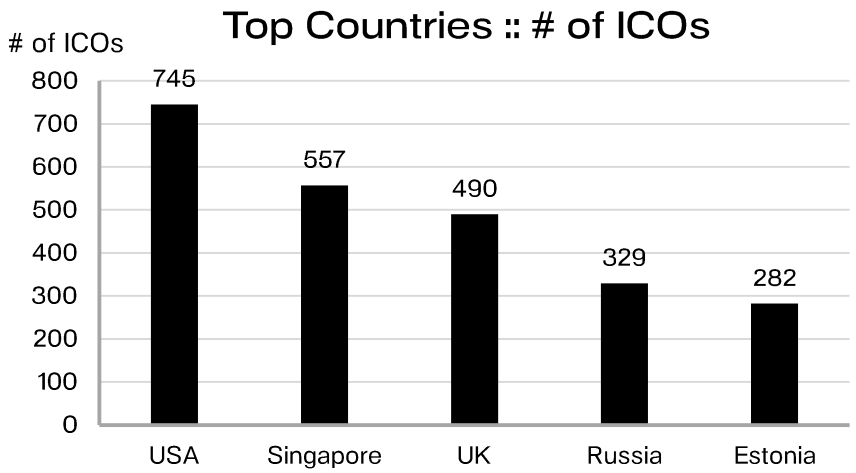


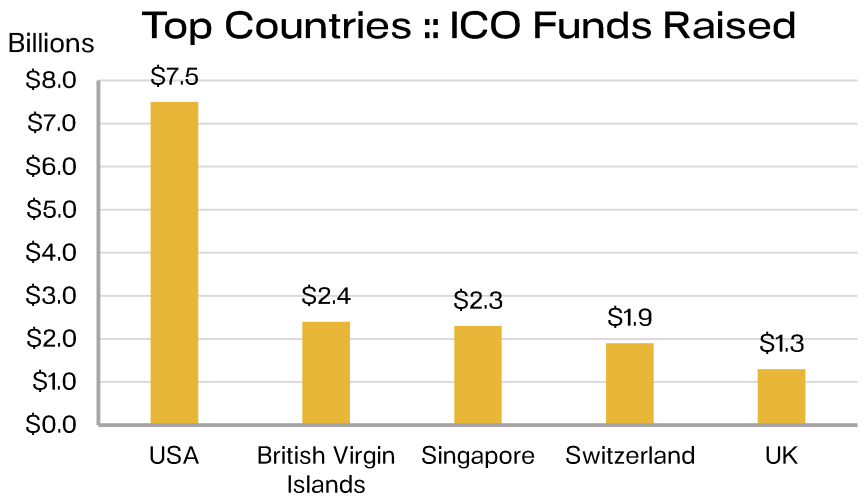
Source: ICORating, Pitchfork, Coindesk

Blockchain Funding (2 of 2)

- ICOs peaked as a funding mechanism in Dec 2017
- Venture and ICOs flipped in Aug 2018 as the dominant source of funding
- ICOs as percentage of total funds raised dropped to 21% in Mar 2019
- Heavy concentration of projects in U.S. -- Silicon Valley in particular

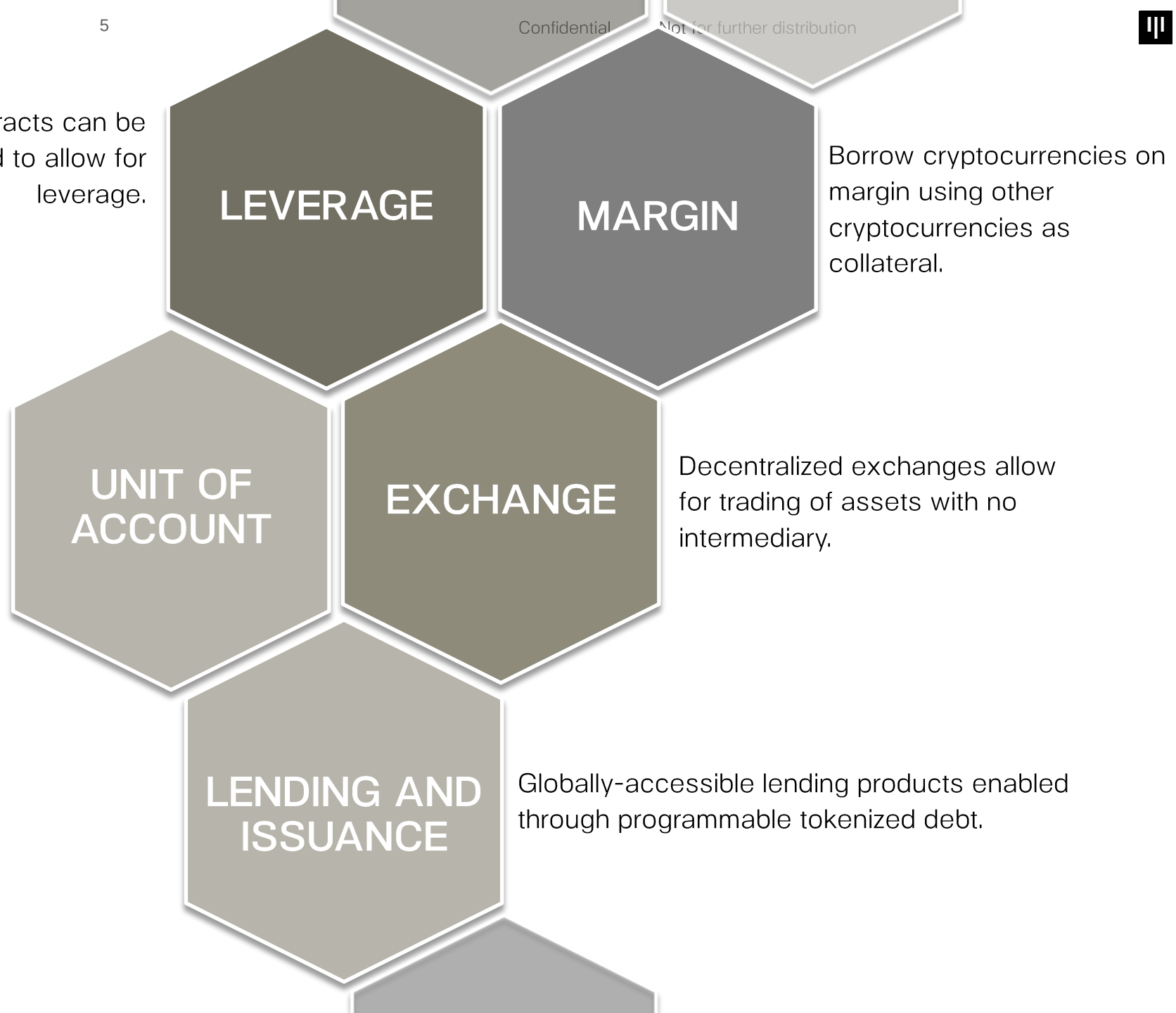






Decentralized Finance (DeFi)
(1 of 2)

Smart contracts can be structured to allow for leverage.



Borrow cryptocurrencies on margin using other cryptocurrencies as collateral.

Stable currencies can be used for trade and commerce.

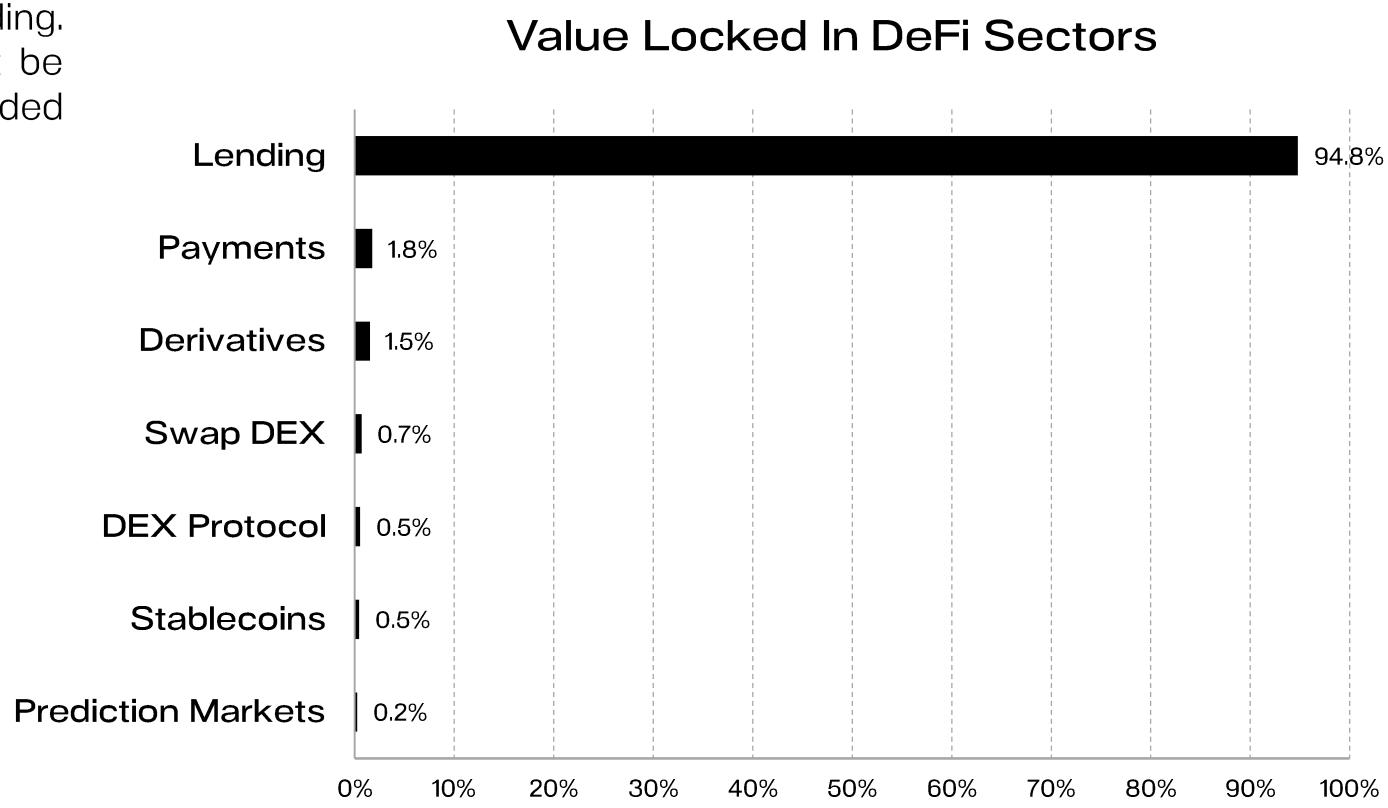
Decentralized exchanges allow for trading of assets with no intermediary.

Globally-accessible lending products enabled through programmable tokenized debt.

DeFi Statistics (2 of 2)

The vast majority of DeFi value is locked up in lending. It's still early on and current allocations may not be indicative of what's to come. Lots of work is needed on user experience and onboarding.

Leading DeFi Projects	Total Value Locked (USD)
Maker	$405mm
Dharma	$22mm
IDEX	$42mm
dYdX	$5mm
Augur	$1mm



Source: DeFi.dapp.review May 31, 2019

Lending & Borrowing

The market for cryptocurrency lending has grown significantly in both capital committed and technical innovation over the past year. The top 4 lending protocols (listed below) accounted for $250mm in loan originations at the start of 2019.

Top Lending Protocols

MAKER Compound

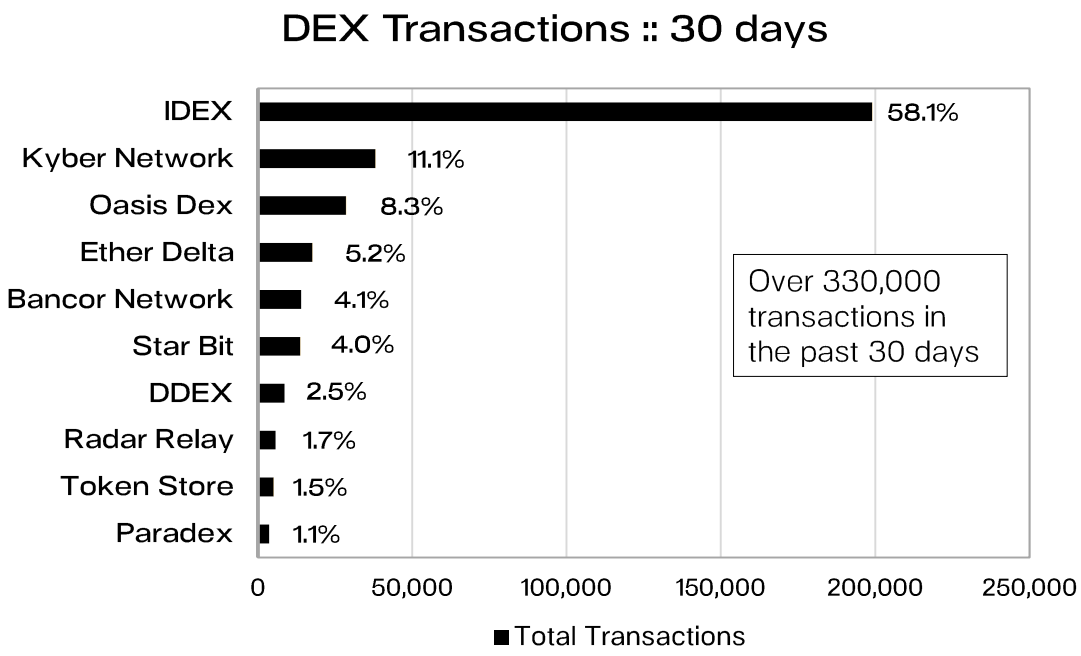
Dharma δY/δX

Emerging Trends

1. Decentralized P2P Lending	P2P lending platforms built on top of decentralized protocols will allow access to a vast pool of liquidity
2. Crypto-backed loans	When using cryptocurrencies as collateral for loans, value can be marked to market and liquidated more freely compared to fiat-based securities
3. Margin lending	Borrowing cryptocurrency on margin using other cryptocurrencies as collateral

Decentralized Exchanges (DEX)

The decentralized exchange landscape is growing as the need for non-custodial, P2P exchange technology is becoming more imperative. Over **$1.3 billion** in cryptocurrency has been **hacked** according to a research report from the The Block.



Source: Etherescan.io taken June 6, 2019

TYPE	PROS	CONS
Decentralized Exchanges	• Non-custodial • Privacy and transparency • Lower fees • Faster trading through Atomic swaps • No server downtime	• Less proven technology • Liquidity constraints • Scalability constraints • Regulatory uncertainty • Lack of customer support • Poor UX
Centralized Exchanges	• Higher liquidity • Better UX • Regulatory compliance – AML/KYC • Customer support • Trading tools and features	• Users don't hold private keys • Susceptible to hacks • Trust is required • High trading fees • Lack of privacy

Prediction Markets

Prediction markets are continuing to democratize finance by allowing low cost speculation on derivatives. As far as market leaders, Augur is emerging as the leading prediction market protocol built on Ethereum.

Augur Metrics

Pre-Finalization Market	449
All-Time Finalized Markets	2,006
Pre-Finalization Open Interest	$520,066 (2,112 ETH)
CASH Contract	$1,040,400 (4,258 ETH)
ETH Price	$244.32

Source: Augur Weekly Report June 5th

Examples of things to speculate on:

- Political Forecasting
- Event Hedging
- Weather Prediction
- Cryptocurrency Speculation

Solving Invalid Market Scams

Problem: Market creators were creating invalid market scams that would net them profits upon market resolution. A common approach was to set a market's end date/time before the outcome would be known.

Incentive-Based Solutions:

- ➢ Liquidity Sort
- ➢ Tradeable Invalid
- ➢ Invalid Filter
- ➢ Floating Formula for Invalid Bonds

Stablecoins (1 of 2)

Stablecoins proliferated in 2018 with major companies like Gemini and Circle launching their own versions. JPMorgan jumped onboard announcing their stablecoin project in February 2019. Facebook is working on their own as well.

Importance of stablecoins:

As a unit of account, stablecoins are superior to volatile cryptocurrencies. Stablecoins will be used in dApps since they represent a stable unit of account.

Augur bet scenario:

- 1 ETH valued at $100 is bet on a market;
- You win and are paid out 1 ½ ETH;
- Meanwhile, the value of 1 ETH dropped by 50%;
- Total USD value is 25% less than your initial bet

You win but you still lose…

Top Stablecoins	Ticker	Backed By	Market Cap
Tether	USDT	Fiat	$3,126,503,120
USD Coin	USDC	Fiat	$358,688,857
TrueUSD	TUSD	Fiat	$234,166,099
Paxos Standard	PAX	Fiat	$173,430,559
Dai	DAI	Crypto	$80,345,095
Gemini Dollar	GUSD	Fiat	$21,506,75

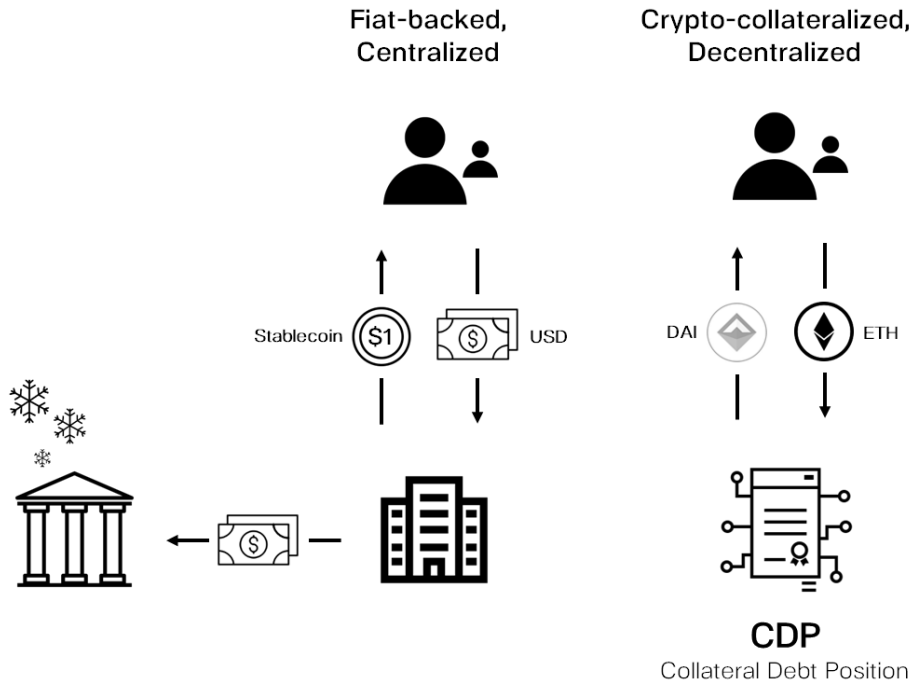
Market Caps taken on May 29, 2019

Stablecoins (2 of 2)

Centralized vs. Decentralized Stablecoins

Tether 74% backed – *Need for decentralized approaches?*

In early April, Tether was exposed for operating at 74% collateralization due to an $800mm cover up scheme in Bitfinex's books.



TYPE	PROS	CONS
Fiat-backed, Centralized	• Stability of fiat • Formal Audits (in some cases) • Regulated	• Funds can be frozen/confiscated • More susceptible to fraud • Trust required
Crypto-collateralized, Decentralized	• Decentralized • Smart contract-based • Transparency • Incentive/game theory-based stability mechanism	• Crypto volatility • Distributed governance is less proven • Stability mechanisms are less proven • Unregulated

Private and Federated Blockchains

Two of the largest institutions announced plans for their blockchain projects this year. JPMorgan announced their private blockchain and Facebook is purportedly developing a federated stablecoin.

Project Codename:

Libra

General thoughts on permissioned blockchains:

Just as the internet effectively created a parallel information infrastructure, crypto will build a parallel financial infrastructure. ***And, no, it's not going to happen with private blockchains any more than the internet revolution occurred with intranets.***

Excerpt from "A Crypto Thesis" by Joey Krug

Coin Characteristics	
Type	Stablecoin
Use Case	Value transfer within Facebook products (Messenger and WhatsApp). Possible integration with merchants.
Governance	Facebook in talks of creating an independent foundation to oversee the cryptocurrency. Companies who operate nodes may have say in governance.
Validators	Facebook is supposedly asking companies to **pay $10mm to operate a node for validating transactions**.

Source: TechCrunch article published June 5th, 2019

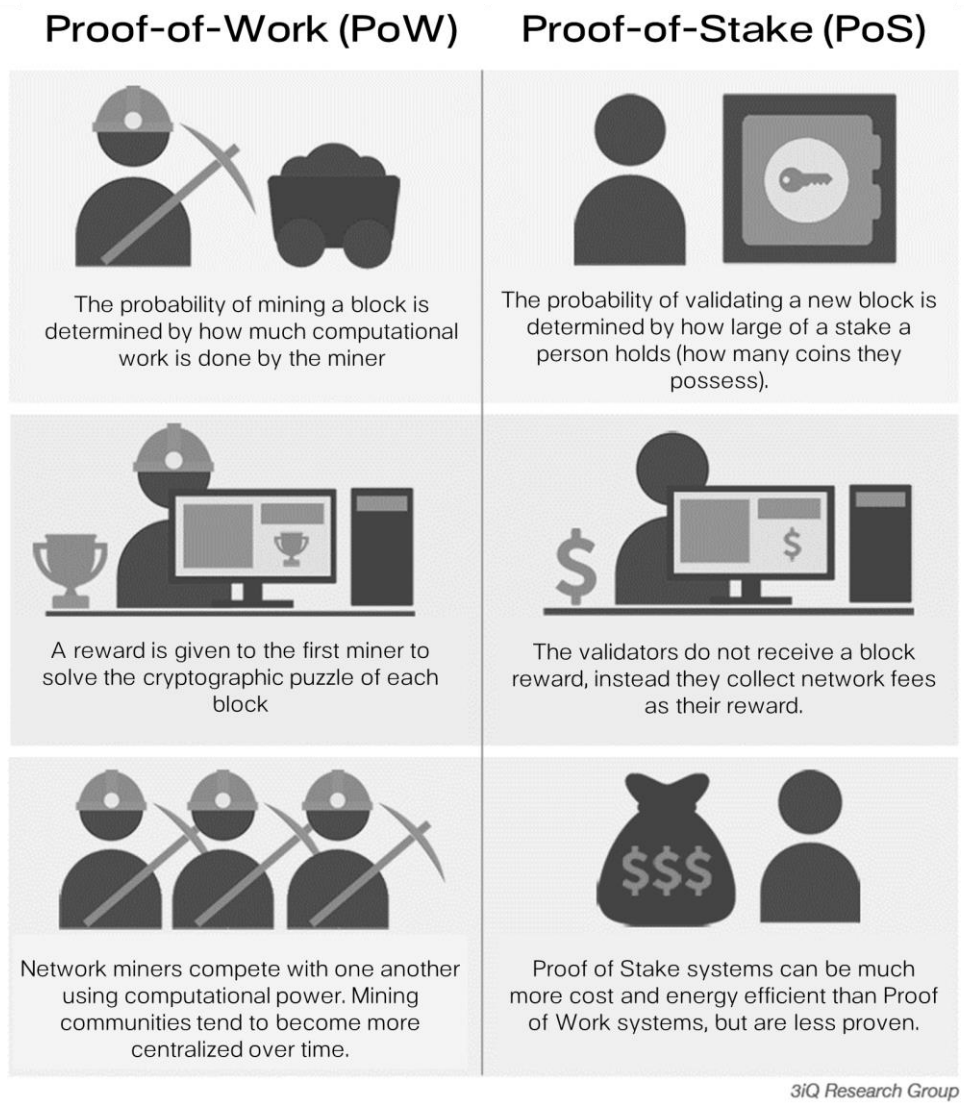
PoW vs. PoS

"Blockchains of the future with proof-of-stake and sharding will be thousands of times more efficient, and so the efficiency sacrifices of putting things on a chain will become more and more acceptable."

– Vitalik Buterin December 10, 2018

Benefits of Proof-of-Stake

- Scalability through sharding
- Removes miner centralization – pools, economies of scale, etc.
- Energy efficiency over PoW
- Ability to stake and participate as a validator



Staked

As more blockchains adopt proof-of-stake as a consensus mechanism, staking infrastructure is growing as well.

Companies like *Staked* are making it easy for holders of cryptocurrencies to participate as transaction validators in proof-of-stake networks.

Overview

- Reliable and secure staking infrastructure
- Compound crypto assets through staking and lending
- Earn passive yields (5-100%)
- Currently Supports: Cosmos, Dash, Livepeer, Tezos, Decred, Horizen, Loom

Non-custodial

Stakeholders can delegate tokens to validators while maintaining control of their private keys.

TOP POS CRYPTOCURRENCIES	MARKET CAP (billions)
Dash	$1.3
Cosmos	$1.1
NEO	$0.9
Tezos	$0.9
Qtum	$0.3
Decred	$0.3
Waves	$0.2

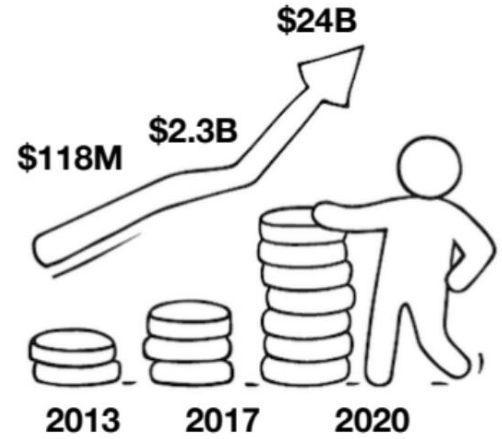
Source: Coinmarketcap.com based on June 10th, 2019

Payments and Merchant Adoption

Cryptocurrency adoption as an investment has outpaced adoption as a form of payment. Over $20 billion of cryptocurrency trades hands every day, but **less than 1%** of that is **spent with merchants**.

Why haven't digital currencies taken off yet?

- Security Concerns
- Tax and Accounting Implications
- Price Volatility
- KYC Compliance
- Regulation Changes
- Resourcing Constraints



Spending is growing

By 2020, it's projected that consumers will spend **$24 billion** worth of cryptocurrency with merchants every year.

Flexa

Flexa and Flex Network Protocol (FNP) are an app and open standard that enable instant cryptocurrency payments in stores and online. FNP is designed to act as an intermediary between merchants and the blockchain offering inexpensive transactions without volatility exposure.

Key Characteristics

- Closed-loop payments and store of value accounts
- Integration with existing merchant processing infrastructure
- *Flexcode* – a universal and backwards-compatible barcode format

Merchant Partnerships

30,000+ locations in the U.S.

Within next 6 months, on target for merchant partners combining for more than $500B of annual revenue

How it works:

Flexa, a mobile app for spending any cryptocurrency

FNP, an open cryptocurrency acceptance network

Flexacoin, a new coin that enables and secures FNP

ICOs, IEOs...

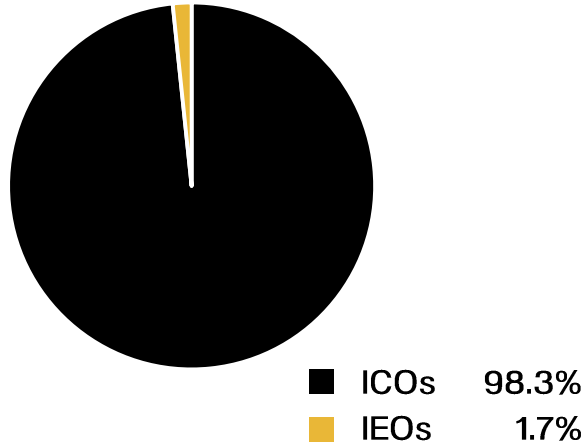
Pending regulatory clarity for ICOs has spurred new methods for token offerings/sales. Now, many projects are conducting public token sales directly through exchanges.

IEO Platforms:

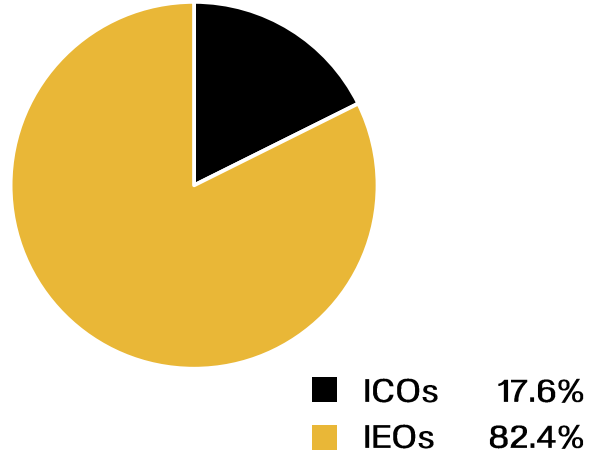
- Binance Launchpad
- Huobi Prime
- Tokinex (Bitfinex)
- OK Jumpsmart (OKEx)
- Apollo (BGOGO)

	ICO	IEO
Crowdsale Counterparty	Token Issuer	Exchange
Project Screening	Individual Investor	Exchange
AML/KYC	Token issuer responsible for KYC	Exchanges KYC exchange users
Liquidity	Wait till listed on exchange	Immediate liquidity
Funds Raised in 2019	$0.3 billion	$1.4 billion

2018 :: Share of Funding



2019 :: Share of Funding



Fiat-to-Crypto Onramps

One of the biggest pain points for cryptocurrency and dApp adoption is the onboarding process. It's difficult to obtain cryptocurrencies with today's nascent infrastructure and poor user experiences.

In order to use any dApps in the future, consumers will need the ability to cheaply and easily get crypto. If they have to leave the app and go to Coinbase and pay 2-4% in fees, it's essentially a non-starter for mainstream adoption.

Places to obtain crypto:

robinhood
coinbase
BINANCE
Bitstamp
BITFINEX

wyre

Differentiator:
Wyre is a developer focused tool that allows for easy on-ramping within dApps.

Wyre SDK:
Applications can onboard users quickly using an embedded web module that converts fiat-deposits to crypto.

What does this mean?
- dApp user drop-off rates fall
- Better user experiences for dApps
- Lower fees for users
- Streamline AML/KYC processes
- Institutional* and retail adoption of dApps

Scalability Overview

The majority of blockchains can process roughly **10 TPS on average**. Limited throughput is a non-starter for global adoption. As transaction capacity limits are hit, **fees skyrocket**, **confirmation times increase**, and **network congestion ensues**.

Network Comparison

	tx/sec
Bitcoin	4-8
Ethereum	10-15
PayPal	100-500
Visa	10,000+
Mastercard	10,000+

Main Scalability Components

1. Networking

Broadcasting transactions across a network of nodes takes significant time. If you can decrease propagation times, then throughput and speed increase.

2. Storage

Blockchains store a massive amount of data that requires significant hard drive space. If you can compress data, this leads to lower storage space required and faster propagation of transactions.

3. Computational Power

High computational power is necessary to process transactions quickly, store the blockchain, etc. But even if you had a 10x stronger computer, you would still run into bandwidth issues.

Scalability Solutions

LAYER 2	**STATE/PAYMENT CHANNELS**	**SIDECHAINS**	**PLASMA**	**STARKS**
	Collateralize contracts with capital and then sign messages off-chain to move money around	Systems like Cosmos or Polkadot are ways of connecting parallel systems to chains like Ethereum	Create and maintain an off-chain state that then interacts with the main blockchain. e.g. Gluon Plasma and Arbitrum	Verify bundles of transactions in the form of a proof–avoid processing every transaction
LAYER 1	**SHARDING**	**BLOCK SIZE LIMIT**		
	Slice up the blockchain into n slices and users pay attention to their own slice.	Simply increase the block size limit. This could lead to less decentralization due to increased costs of running nodes		
LAYER 0	**BLOXROUTE**			
	Solve the underlying networking problem through Blockchain Distribution Networks (BDN) to help propagate blocks faster			

StarkWare

StarkWare brings scalability and privacy to blockchains through **Z**ero-**K**nowledge **S**calable **T**ransparent **AR**guments of **K**nowledge (ZK-STARK)

SCALABILITY

Off-Chain Computations

STARK is an asymmetric protocol: the verifier's work is exponentially smaller than the prover's.

Conducting a prover's work off-chain and verifying on-chain allows massive scalability without trust assumptions.

PRIVACY

Private Inputs are Shielded

Zero-knowledge allows for shielding of private inputs without compromising computational integrity.

Private information can be kept off-chain while verified on-chain.

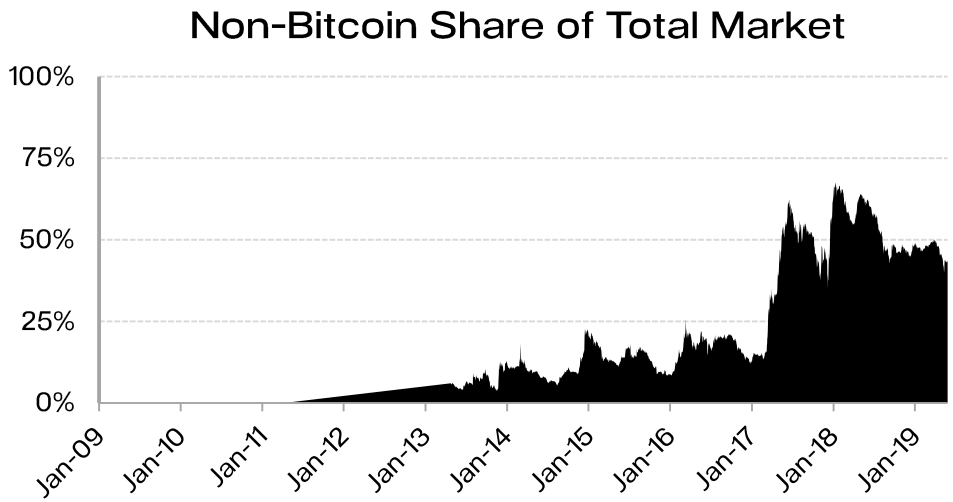
Applications:

StarkDEX	StarkPay
A scalability engine for DEXes that will allow them to handle 10,000 trades per block. Partnership with: 0x	A payment scalability engine based on STARK technology that offers a scalable, capital-efficient, non-custodial payment solution.

Blockchain Interoperability

As different cryptocurrencies have proliferated over the years, the need for **inter-blockchain communication** has become a necessity. The idea is that value and information can move between different blockchains with different consensus mechanisms.

The chart below illustrates the explosion of different blockchains over time by share of total market cap.



Interoperability Protocols

	COSMOS	Polkadot.
Consensus Mechanism	Tendermint	GRANDPA
Communication Protocol	(IBC) Inter-Blockchain Communication	(ICMP) Inter-chain messaging among parachains
Architecture	Hub-and-zone	Relay Chain and parachains
Launch Date	Live	Q3 2019

dApp Platforms

- Majority of development is being done on Ethereum
- 58% of active dApps are on the Ethereum blockchain
- Ethereum is far more decentralized in node count and developers

	Ethereum	EOS	Tron
Consensus Mechanism	PoW	DPoS	DPoS
Market Cap[1]	$26 billion	$6 billion	$2 billion
Nodes / Block Producers[1]	8279	21 active (481 standby)	1400
Active Addresses[2]	200,000	70,000	60,000
Core Protocol Developers[2]	99+	30+	25+
Active dApps[3]	752	326	157

1. Based on June 10th, 2019
2. Source: blokt taken end of Q1 2019
3. Source: CoinGecko Q1 state of blockchain report

PANTERA

pan terra (Latin), ‘spanning the earth’

pantera (Italian and Spanish), ‘panther’

pan era, ‘spanning eras’

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