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THE FUTURE OF THE FIRM:
Can decentralized autonomous organizations disrupt the governance and wealth distribution model of the corporation?

TECHEMY GROUP PROPRIETARY RESEARCH 2019

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Executive summary:

Trends such as the gig economy, automation and Agile organizations have been decentralizing the corporate structure for over a decade and we expect mass adoption of blockchain technology to expedite this. Moreover, decentralized autonomous organizations (DAOs) could emerge in the future as new models for collaboration and work that better align stakeholders and shareholders' interests and in future join the growing trend of 'sustainable' (or ESG) investing.

"The potential for blockchain lies in its architectural ability to shift, and potentially upend, traditional economic systems – potentially transferring value from shareholders to stakeholders as distributed solutions increasingly take hold." **- The World Economic Forum**

The nature of 'the firm' is rapidly changing in the Information Age and intangible assets are now regarded as the most important driver of corporate value as opposed to tangibles accumulated in the industrial model - future value is distributed. This poses problems for those still operating in the 'old model' including:

- Difficulty in valuing intangible assets in digitally native organizations
- A continuing decline in corporate accounting and auditing standards
- New forms of fundraising, such as Security Token Offerings - less costly than IPOs
- Security tokens offerings which can blend equity rights and debt with governance
- Growing social responsibility for corporations to account for 'external costs'
- Mounting social costs for corporations such as climate change value-at-risk.
- The concentration of share value and corporate earnings in growth and tech stocks invested through passive strategies increases systemic risk in the stockmarket

A DAO can be summated as an organization of people who communicate with each other via a "network protocol," communicating with one another through an online ruleset but reaching governance consensus with offline diplomacy. Facebook has also just announced it intends to turn its crypto project Libra, into a DAO utilizing a native governance token, the Libra Investment Token, a huge aboutface for a company notorious for its autocratic CEO.

In this report we look at the future constraints for the shareholder model in its current form, the game theory behind mass scale decentralized cooperation and why organizations operating this way will be superior to today's corporate firm structure. For investors, we see DAOs eventually becoming a less risky investment class compared to shares in a regular company, with more predictable ROI as they minimize two of the greatest risks in the running of a company - human error and self-interests. They also offer better passive returns than most stock dividends in the form of coin-staking and running of masternodes.

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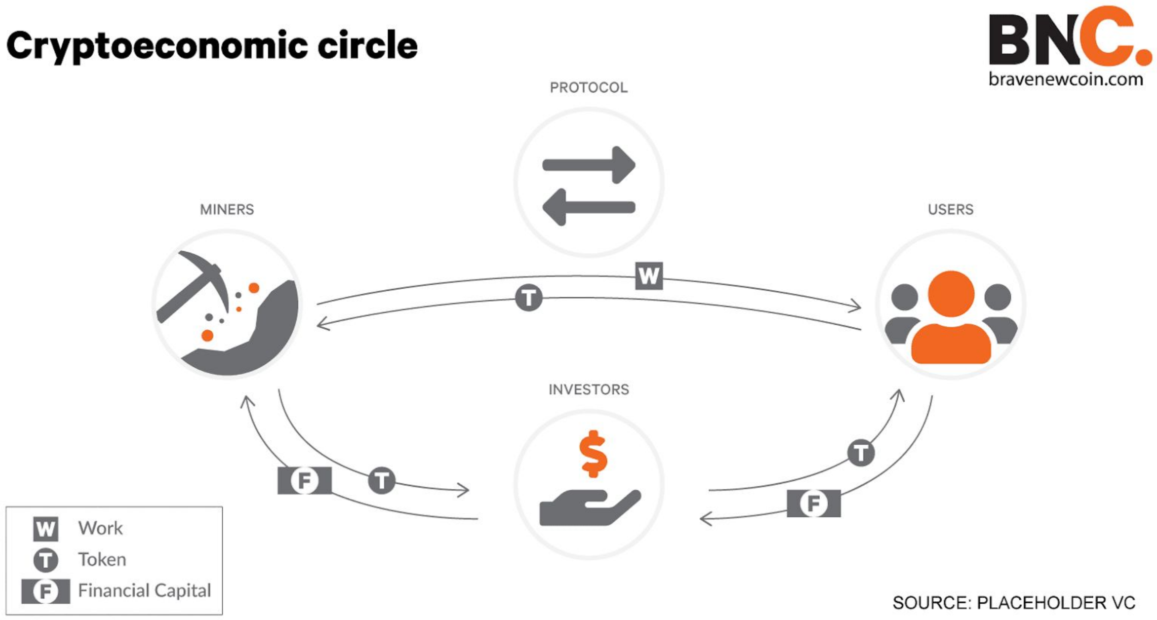
Corporate governance as mini economies

The age of digital native companies which transcend national borders and span multiple industries necessitates a new style of organization; or in the words of Alibaba CEO Jack Ma:

"Management. The word is there for regular companies. At Alibaba, we treat it more like governing an economy, as we have to manage so many companies' dependent upon us as partners... By 2036 we will have built an economy that can support 100 million businesses for billions of users. We won't own that economy. We will just govern it."
- Jack Ma, Alibaba CEO

This is the future of blockchain-based governance: organizations run like economies as internet native firms transcend national jurisdictions and are governed more by internet protocols.



Joel Monegro of Placeholder Ventures, describes cryptocurrency networks as cryptoeconomic circles of value flowing between the three main actors in the network: miners (supply side), users (demand side) and investors (capital side). As such, Bitcoin can be viewed as the first DAO, albeit with a somewhat crude governance model.

Instead of exchanging currencies like regular economies, in this cryptoeconomy model, labor is exchanged for capital (the value of the network's scarce cryptocurrency/token). We can possibly view cryptocurrency networks as emerging economies, especially those that are built with on-chain governance, with their own taxation systems (treasury funding and miners' rewards) and inflation rates. In cryptonetworks with scarce tokens, labor and value are inseparable.

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DAOs, creating more democratic organizations?

DAOs are being recognized as a step to addressing many of the economic, ecological and social problems that the shareholder model has perpetuated: wealth inequality, exponential growth and the degradation of the environment and individual health.

Decentralized autonomous entities can be created as corporations (DACs) with a shareholder model with dividends etc not dissimilar to the legacy capitalist system, or as more equitable co-operative organizations in which every member has an equal vote.

Degrees of decentralized organizations

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Uber	Kyber Network	Dash	Tezos, Decred	Aragon / DAO stack
Distributed workers in 'gig economy', centralized governance and shareholder model	'Reverse DAO', currently voting to decentralize treasury and other operations	Pivoted from private Bitcoin fork to decentralized governance with masternodes	On-chain governance, off-chain diplomacy through smart contract platforms	Digital jurisdictions on which to create and regulate DAOs and codify protocol

SOURCE: BRAVENEWCOIN.COM

The first wave of platform-as-a-service (apps) organizations like Uber generate network value like a crypto network but their business model is centralized. It reaps all the benefits of a centralized company (worker allegiance and the lion's share of the profit) without having to pay for many of the legal responsibilities, defined pension plans, holiday pay or guaranteed hours.

There are already decentralized versions of Uber and Airbnb that are aligning stakeholders with their user communities. Some of the rights accorded to stakeholders (token holders) include voting on how to allocate the profits of the decentralized organization (funds in a smart contract). This new model is being replicated across the app (or Dapp) ecosystem and time will tell whether workers and users migrate to these digital co-ops that can cut out the middleman and potentially deliver a more equitable working relationship.

However, it would be naive to believe that DAOs and will be a quick fix for democracy so far there has been the same voter apathy in blockchain voting. Some DAO models, especially those using pure Proof-of-Stake, will perhaps be even more plutocratic than what we have now and results in several blockchain ballots have been skewed by large stakeholders. But a form of plutocracy could improve decision making if it's based on voter reputation, such as the DAOstack model.

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Blockchain-based voting innovations

Proof-of-stake (PoS), in which votes are weighted by the size of the voters' stakeholding and Delegated-proof-of-stake (DPoS), whereby smaller voters can delegate their decision-making to select 'wealthier' and more informed stakeholders, are the two dominant consensus mechanisms in decentralized governance, with DPoS most analogous to real-world representative democracy.

Two of the most prominent DAO projects, Tezos (XTZ) and Decred (DCR) use DPoS and a proof-of-stake/proof-of-work hybrid respectively.

Some DAO projects are trying to improve upon the DPoS voting system with 'liquid democracy', a hybrid of direct and indirect voting . Quadratic voting, whereby a voter votes not just on an issue but how strongly they feel about the issue and even allows for vote buying, is also being used in some DAO projects and may also be a future form of governance in the Ethereum network.

Many initiatives in the DAO space could well be described as 'social impact' projects, while others are more focused on reinventing the corporate governance model. DAOs like Aragon (ANT), Tezos (XTZ) and Decred (DCR), for example, are addressing governance specifically, while others like Democracy Earth are tackling the wider social issues of democracy and universal basic income through quadratic voting.

However, the end-goal of all DAO projects is to align the organization with stakeholders' interests and improve cooperation and participation through game-theoretic monetary incentives.

The meaning of work in the 21st century

Decentralization is well underway in many parts of the economy, exemplified by outsourcing and the armies of freelancers on Fiverr and Upwork. According to Nasdaq, 43% of the American workforce will be freelancers by 2020.

Not only are legacy industries cutting staff en masse, but they are also trying to change their organizational structure by removing many middlemen/middle-management jobs and distributing decision-making. Such an example is the spread of the Agile methodology into new industries from the software sector which developed it - with varying degrees of success. The Agile method is a first step in dissolving the vertical top-down structure of traditional companies.

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Productivity gains enabling decentralized organization

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Adoption of new tech	New forms of distribution	New forms of cheaper energy	New use of raw materials & labor	New forms of organization
Blockchain, AI, Machine learning, big data	Ubiquitous internet, 3D printing, digital currencies and internet of value	Renewable energies, shale and even nuclear	Lithium, silicon, palladium, cobalt, programmers and data analysts	Remote working, Agile methodology, 'Gig economy'

SOURCE: BRAVENEWCOIN.COM

According to Fred Emery, the late scientist of open systems dynamics and a proponent of decentralized organizations: "Recovery from the deep crises of industrialism has always depended upon the emergence of a more effective social form for eliciting productivity."

Blockchain technology is a critical link in the evolution of human organization and work that has taken place since the 2009 global financial crisis.

Teal organizations: evolving open systems

Teal is an even more evolved form of decentralized self-governance, created to reflect complex adaptive systems (any living creature, cell structure) and to be more resilient. A Teal organization is often characterized by having its own purpose distinct from that of its individual members, which evolves to its environment. Although job titles remain, relationships are always peer-to-peer and, in some cases, the employees even propose their own salary and hours.

Patagonia: Example of a real-world DAO?

Outdoor apparel maker Patagonia is a famous example of a Teal organization. It aligns stakeholder and shareholder interests through environmental protection. It adopts the inverse of most retail manufacturers in that it rarely advertises, doesn't promote consumerism through marketing and makes products from recycled materials that come with a lifetime guarantee. The company is also privately held so forgoes the most egregious shareholder conflicts of interests.

While Patagonia is a 'flat' organization it has a CEO, marketing director, and digital creative director. Each of these department managers have employees working under them to achieve departmental goals.

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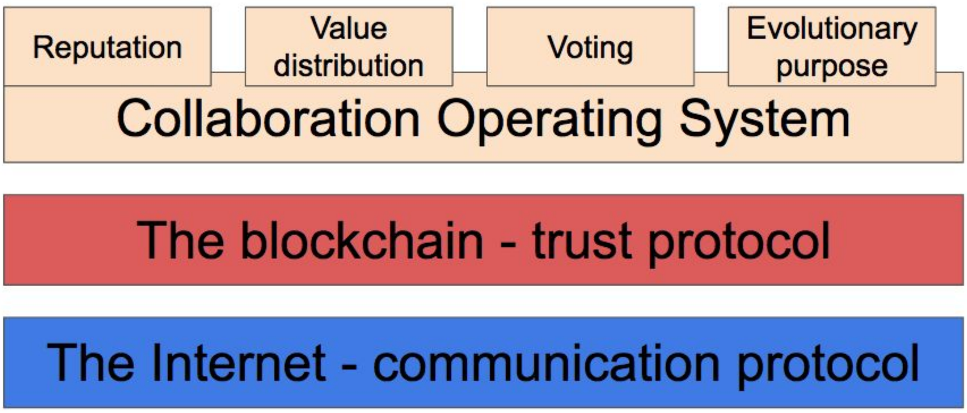
Despite these titular authorities, chairman and founder Yvon Chouinard has decentralized authority by allowing employees to take a greater role in strategy and operations. Patagonia initiated a management tool that Chouinard terms the 5-15 report, in which employees spend 15 minutes each week writing reports for management detailing their ideas, obstacles, and their views on the business.

How DAOs are shaping the future of work

From a worker's perspective, there are many drawbacks to the current gig economy. It comes with no employer benefits or assurances, suppresses full-time workers' salaries and skews employment figures as many gig workers are technically underemployed.

DAOs are an important near future step in the transition to a predominantly freelance economy: they allow for more meritocratic organizations and rewards; global digital cooperatives with native currencies can align interests among many co-workers and community stakeholders.

How is this trustless cooperation possible? Blockchain can been described as a 'trust layer' built upon the internet that obviates the need for people to know who they are interacting with in order to verify data or transactions for example, Bitcoin. But built on top of these protocol (trust) layers is a 'second layer' which can include governance and organizational systems.



Source: *Mark Pascall*

This layer would need to incorporate things such as ways to:

- Manage/track reputation (e.g. a non-transferable unit of measure that reflects the degree of alignment of a participant within a network of peers), akin to Airbnb reputation but more verifiable and comprehensive.
- Manage/track value distribution, (e.g. tokens that are issued automatically whenever a contribution is recognised as valuable by the majority of reputation in a network). Similar to shares in a company but tied not only to financial investment but also time/effort investment and reputation.

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- Allow voting so that decisions to be made by the community (perhaps weighted towards people with higher reputations or token ownership).

There are already several projects building the ‘second layer’ infrastructure to streamline the set-up of DAOs with the aim of making it as easy to establish a digital company as it is to deploy a website today.

Some projects such as DaoStack are building operating systems to decentralize the governance of digital as well as physical organizations; Backfeed is a protocol that looks after the distribution of rewards (tokens) to contributors based on their reputation and input; similarly, Colony is a platform for building decentralized digital companies with customizable structures and native currencies; among Boardroom is a governance framework for decentralized apps for individuals and companies to manage their smart contracts and can be integrated into traditional companies also. To handle trade disputes among these decentralized companies Aragon is a digital jurisdiction for DAO arbitration.

A defining feature of DAOs is the focus on building long-term internal network value for stakeholders rather than shareholders which is focused on gaining external revenue. There are several strong headwinds to the corporate model as it exists today that may hinder future shareholder returns, as well as posing systemic risks to the global financial system.

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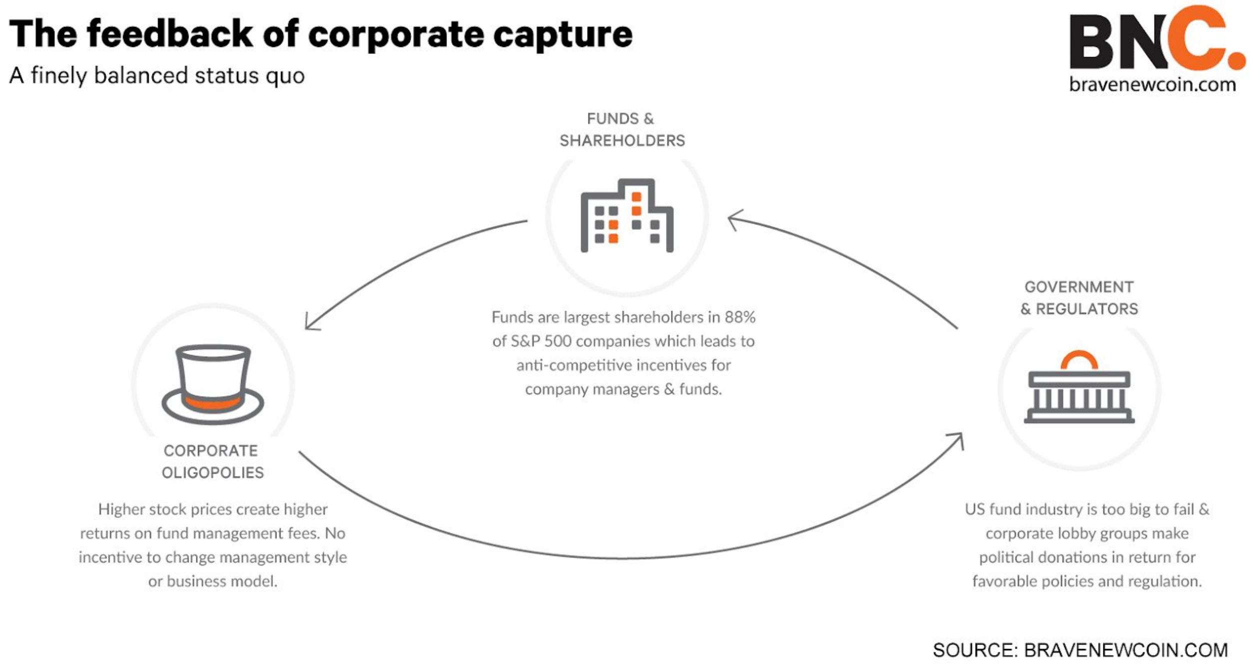
Future obstacles to the shareholder model

I. Corporate capture

Modern corporate governance does little to overcome the classic 'prisoner's dilemma' of cooperative game theory between companies and investors, largely due to the competitive nature of markets increasingly characterized by a winner-takes-all economy.

In the US, the corporation owns the firm and as it is a legal entity, it needs legal representation in its relationship to other social entities. The group of human beings empowered with the right to act in the name of the corporation are its board of directors. The board acts as the coordinator in setting the goals that are supposed to integrate all stakeholders' interests and the board is accountable to the corporation.



However, as the corporation is a legal 'person' it has the right to influence and lobby governments and donate large sums to election campaigns. This has led to corporate capture of government that has thwarted climate change action and antitrust regulation in Big Tech and Big Pharma.

Recently, however, CEOs of 200 US multinational corporations signed an agreement to demote shareholder returns as their corporations' number one objective for more stakeholder interests. This comes after a bill, the Accountable Capitalism Act, was submitted to Congress that would

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reduce executive stock-incentives to maximize shareholder wealth and reintroduce workers as representatives on company boards.

Today the biggest shareholders of companies are companies themselves and large fund management firms and the agreement CEO is non binding so will be difficult to enforce or measure its success.

II. The shareholder-stakeholder conflict

The board is hierarchical because of the nature of corporate ownership. Company executives are largely answerable to the board of directors and shareholders rather than their stakeholders, but this wasn't always the case. In the early 1980s, major US corporations designated around half of their earnings to shareholders and reinvested the rest in the company. However, today large US companies dedicate 93% of earnings to shareholders.

In contrast, DAOs are not companies and do not have legal personalities and the rights that accord to the contemporary firm, but are akin to co-operatives in cyberspace. DAO governance and token-economics are a first foray into decentralized coordination on a mass scale.

Corporate conflicts in shareholder model:

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Shareholder Vs Stakeholder	Principal Vs Agent	Long-term Vs Short-term
• Shareholders are always stakeholders but not vice versa e.g. employees, suppliers and local communities rarely have skin in the game or benefit from the company's share price • In US, 93% of company earnings goes to shareholders in dividends, share buybacks • Interests of shareholders and non-shareholders rarely aligned	• In agency theory, the principals are shareholders and company executives are the agents • Chief conflict is incompatible risk tolerance between agent and principal • Among the 'resolutions' is the offering of incentives to corporate managers to maximize the profits of their principals. • Stock options awarded to company executives have their origin in agency theory	• Long run interests of Sovereign Pension funds Vs short term interest of Hedge Funds. • Those contradictory forces affect corporate governance • They have the means to influence boards and manipulate general assemblies, • Hedge funds seek maximum absolute returns in the short run and use arbitrage strategies to get them, while insulating themselves from market risks

SOURCE: BRAVENEWCOIN.COM

Instead of the 'C-suite' rising and falling with the short-term interest of shareholders and share price, future decentralized corporate governance will consider all other stakeholders in a company: employees, customers, communities.

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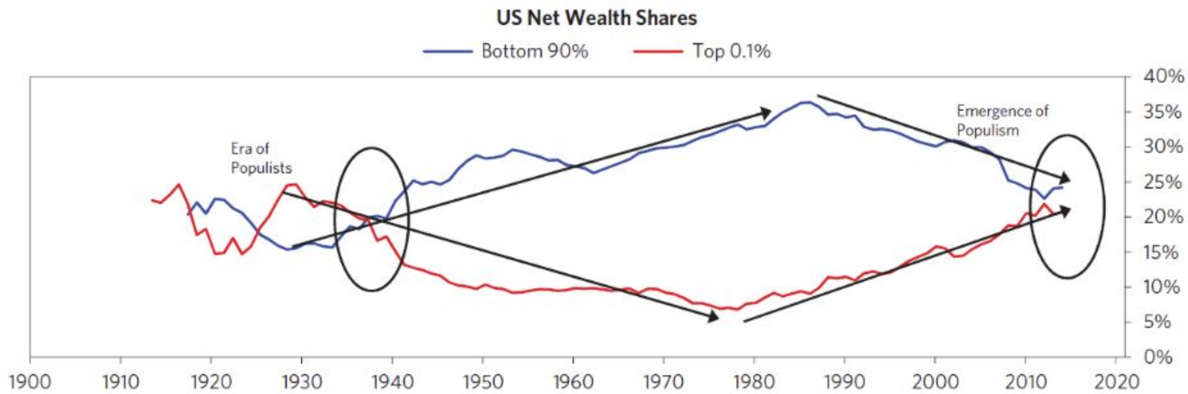
According to economist Michel Aglietta, hedge funds “get their voting power from borrowing large amounts of equity from a particular corporation, to resell it, presumably with a capital gain. One cannot expect that such behaviour would provide a common interest for the stakeholders of a firm and provide guidance on long run strategies with their asset allocations.”

III. Rising social discontent with wealth inequality

Through stock options company executives are incentivized to maximize shareholder return and the concentration of stock ownership in the US has been widely attributed to the rise in inequality.

Instead of corporate profits going to productive causes, from 2007 through 2016, stock buybacks by 461 companies listed on the S&P 500 totaled $4 trillion, or 54% of total profits. Annual mean remuneration for CEOs doubled in the same period. Share buybacks skews the health of a company as it lifts earnings per share (EPS) even when corporate earnings may have actually declined. Buybacks have been described as a legal form of "market manipulation."



The chart shows the previous points in the last century when the wealth of the top 0.1% in the US was equal to that of the bottom 90%. Source: Ray Dalio

The last time the wealth of the top 0.1% richest people in the world was the same or more than the bottom 90% was during the 1920s and 1930s, which gave rise to the populist politics of the 1920/30s - a flavor of politics that is reemerging globally today.

IV. Share buybacks 'open market manipulation'

Share buybacks have been blamed for the decline of the middle class and have risen in tandem with inequality in the US, as the reinvestment of profits that used to go into productive pursuits (staff training, equipment upgrading, worker bonuses) now goes to shareholders, who are a minority of the US population.

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Democrat presidential candidate Senator Elizabeth Warren credits this obsession with shareholder profits as the "root cause of many of America's fundamental economic problems." Fund managers and large corporations form a sort of plutocracy - governance by wealthy - that observers have drawn parallels with the Gilded Age.

There is a strong push in this US presidential election towards a form of social democracy, propagated by Elizabeth Warren, Bernie Sanders, Alexandria Ocasio-Cortez and Andrew Yang. If a progressive is elected as the next president we could expect to see a change in regulation around share buybacks

V. Growth and tech stocks dominate global corporate earnings

The strong trend in tech stocks in the past decade has seen growth companies outperform more traditional value companies (those associated with Warren Buffett style investing) as investors forgo dividends and chase capital gains. This has led to a self-reinforcing cycle where growth stocks beget more growth due to future expectations of capital gains.

The chart shows FANG stocks (the six biggest US tech stocks) account for roughly 70% of worldwide corporate earnings.

However, many of the growth stocks, epitomized by the FANG (Facebook, Amazon, Netflix and Google) stocks, face regulatory headwinds especially in the lead up to the US presidential election in 2020. Several candidates are campaigning to break up Big Tech and close the inequality gap.

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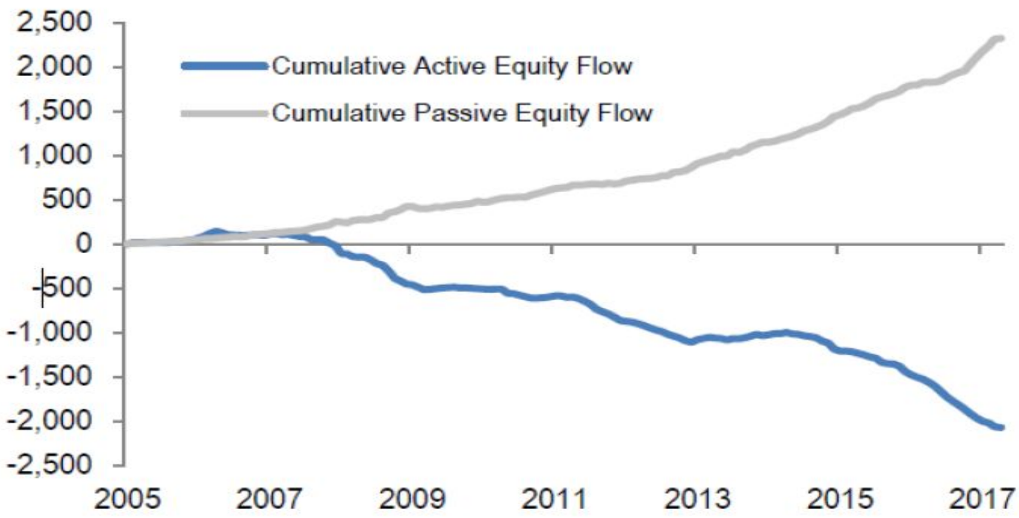
Big Tech is also caught in the trade war between the US and China, both on the supply chain side and also for political and surveillance reasons. A new form of trade protectionism is developing, between rival superpowers and could constrain the future growth of Google and Facebook on the US side and their Chinese counterparts equally.

VI. Systemic risks in stockmarkets

The rising trend of passive investment strategies for the past 20 years has created systemic risks in global stockmarkets: a US asset management industry too big to fail and an overleveraged long position in the stock market.

CUMULATIVE FLOWS INTO PASSIVE AND ACTIVE EQUITY ETFs AND MUTUAL FUND ($BN)



Source: J.P. Morgan Quantitative and Derivatives Strategy, EPFR Global

Around 90% of the equity money flows today are passive (ETFs, index funds, risk parity funds etc) or quasi-passive (trend-following algorithms, momentum strategies, factor investing, machine learning) and 90% of all strategies are either trend or volatility linked.

VII. The decline in corporate accounting standards

In the Information Age it is increasingly the case that intellectual labor, not manual labor, powers corporate and economic growth. This presents difficulties as analysts, accountants and even managers struggle to put a value on human capital and distributed value.

According to Nakamura (2003) and Corrado (2006) between 6 and 10% of GDP is spent every year on intangibles - and that figure will be likely higher again in 2019.

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The declining accounting standards of the Big Four accounting and consulting firms (originally the Big Eight) - Deloitte, PWC, EY and KPMG - have become such a concern that the UK's Competition and Markets Authority has recommended breaking the accounting arms up from their more lucrative consulting arms.

"People's livelihoods, savings and pensions all depend on the auditors' job being done to a high standard. But too many fall short – more than a quarter of big company audits are considered sub-standard by the regulator. This cannot be allowed to continue."
- UK Competition and Markets Authority

Accounting is often a loss leader to sell consulting services and it has resulted in many conflicts of interest, including auditing rival firms and consulting on mergers and acquisitions. Along with 'digital transformation', the Big Four consulting firms now all consult on blockchain. Ernst and Young recently released proprietary tech that would enable private (Zero-knowledge-proof) transactions on the Ethereum public blockchain. On the announcement, EY's head of global innovation Paul Brody summed up blockchain's potential:

"Public blockchains will be a productivity revolution, just not the kind you were expecting... With blockchains, all we have to lose is our administrative complexity and transaction reconciliation paperwork."

Such a banal summation of blockchain from a corporation ensconced in the preservation of centralized institutions, governmental and corporate, may not be that surprising as the Big Four only support changes that sustain their position of privilege by reinforcing the status quo of who benefits. The financial transparency of DAOs (Aragon makes all of its expenses and treasury movements public as well as a direct view into the treasury wallet at all times) - obviates much traditional auditing and would make future organizations more accountable and less able to engage in 'creative accounting'.

In summary, as a result of conventional accounting practices, corporations have not been required to recognize some of the most significant inputs and the costs involved in their business - externalities such as climate change and water degradation, and cannot meaningfully integrate the value of intangible assets like intellectual property, human capital, creativity and brand recognition. It has also left loopholes for tax evasion often exploited by corporations.

VIII. New forms of company public fundraising

Security token offerings (STOs) are an emerging alternative to private equity and VC financing as they allow for businesses to lock in funds without locking in investors. They are a more compliant evolution of the breakthrough peer-to-peer fundraising model Initial Coin Offerings (ICOs). An

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STO may create a non-dilutive way of financing a company's portfolio, allowing it to raise funds without having to sell equity in its portfolio companies, but instead tokenize its cash-flows.

Traditional assets are moving onto blockchain

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LEGACY ASSET	CRYPTO EXPRESSION	CRYPTO ASSET
Gold	Store of Value	Bitcoin
Stocks	Digital Utility	Ethereum
Funds	Blockchain Protocols	Cryptocurrencies
Real Estate	Digitised Equity	Security Tokens
Commodities	Fractional Ownership of Assets	Security Tokens

SOURCE: BRAVENEWCOIN.COM

Like any cryptographic asset, security tokens can be programmed to bear the same legal rights as traditional financial instruments, and improve upon them, including fractional ownership, governance rights, rights for revenue share, and other hybrid models not previously available with company shares.

Security token groups

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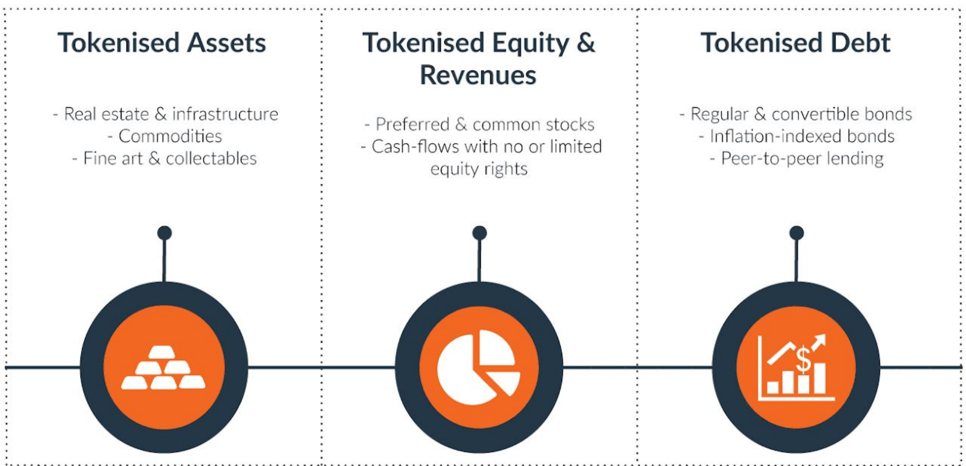

SOURCE: BRAVENEWCOIN.COM

The STO market is projected to reach US$5 trillion by 2022 (if less than 1% of globally traded assets move onto blockchains) and STOs will be preferred in many scenarios to IPOs, especially for high-growth companies with intangible assets such as technology companies whose path to profit is unclear. The IPO flops of Uber and Lyft being such examples.

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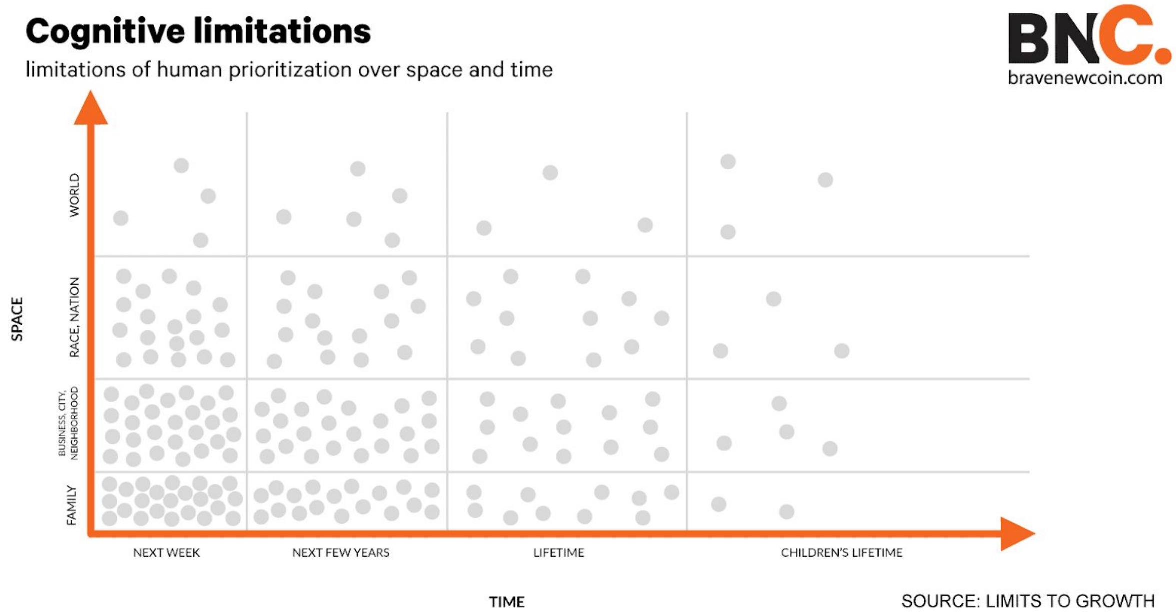
Why is decentralized governance needed?

Avoiding tipping points: A crisis of coordination

Research has shown that policymakers are more risk averse to uncertainty and ambiguous tipping points than to known changes in consumption over time. In other words, policymakers end up paying more at the last minute to avoid a catastrophe - as opposed to changing behavior to avoid the crisis in the first place.

Nowhere is this more obvious than in the area of climate change where there has been little consensus on temperature rise targets of 1.5C or 2C - it is now acknowledged by the UN that we have surpassed even a 3C temperature target and could possibly hit 5C by 2100.

"The lack of knowledge governing tipping point locations in the climate system is severe. We find a framework that explicitly incorporates the Knightian nature of this uncertainty leads to only small upwards adjustments of the optimal carbon tax."
- Lemoine and Traege, Ambiguous Tipping Points



Our current governance models are limited by the short-term priority horizons of policymakers - politicians due to their precarious short term in office and appeasement of voters and CEOs due to the stress of quarterly earnings results and analyst expectations, both of which has resulted in

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a build-up of other systemic risks in society and the financial system that may be nearing tipping points.

In the current environment, companies optimize policy and strategy with respect to their own survival, and not with respect to the benefit of a larger whole. This is particularly acute at large-scale coordination and prevents the transition from competition to cooperation as opening up shared resources is inconsistent with the current economy, locally and internationally.

On the other hand, large-scale open collaboration is the very basis for DAOs which seek to overcome the prisoner's dilemma that characterizes diplomatic stasis in governments, companies and the commons by focusing on stakeholder governance incentives through rewards or dilutions of tokens.

The rise of sustainable investing

These self-organizing digital companies that have an evolving purpose appeal to the millennial generation in particular who put a premium on sustainability and social responsibility for their products and investments than previous generations.

This can be seen in the rise of sustainable investing which screens for companies based on their environmental, social and governance (ESG) performance. From 2012 to 2016 sustainable investing grew around 135% from under $4 trillion to almost $9 trillion and around 70% of Gen Z and Millennials say that they pay a premium for sustainable products. The millennial generation is now the world's largest cohort entering their peak earning years and they are already driving ESG-premiums for traditional companies.

DAOs directly address the governance crisis of corporations with a low carbon footprint and an evolving purpose (through updates to the codebase) and we foresee DAOs in the future falling within the sustainable (ESG) investment category which has great future growth potential .

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Under the hood of a DAO: Game Theory

Game theory is the maths and psychology behind coordinating behavior to reach the most optimal outcome for decision-making. Game theoretic incentives (including skin in the game incentives) is lacking in many organizations, particularly in hierarchical environments.

In traditional companies, the pressure of shareholders skew executive priorities to short-term profits to bolster the share price - often at the expense of employee cutbacks. The basis of DAO governance tokens is to build long-term value in a network by detracting short-term speculation

Markets are coordination games and markets fail when in some state of inefficient equilibrium, established because of conflicts of interests or poor management. No stakeholder has any incentive to move individually which leads to the stasis in international and corporate diplomacy.

Decentralized governance models attempt to address some of the most common game theoretical problems and human biases that plague real-world coordination: tragedy of the commons, prisoner's dilemma, freerider problems, risk aversion and so on.

As mentioned, some crypto networks have reversed their governance model from a centralized (founder group) to a decentralized model by building staking and on-chain voting features into their native token, usually starting with the governance of treasury funds. Dash (DASH) is one such cryptocurrency and Kyber Network (KNC) is another making the transition and there are others. In this section, however, we examine just those coins that have focused on decentralized governance from inception.

What is on-chain governance?

Ethereum and Bitcoin's governance is technically decentralized although done offline, via 'improvement proposals'. These are usually detailed design documents which provide suggestions on improving the blockchain, although these processes are not presented, recorded, passed or voted for on the blockchain itself.

Tezos, on the other hand, uses on-chain governance, simply meaning stakeholders vote on the platform over a proposed amendment and the blockchain self-amends to that outcome.

On-chain governance is done through a variation of proof-of-stake consensus mechanisms by staking the tokens (or coins) of the network being voted on. The first most prominent example of a governance vote was on the Ethereum network after the original DAO debacle, which led to a hard fork of the Ethereum blockchain.

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Futarchy: DAOs and prediction markets

Apart from DAOs being more 'socially responsible' than the shareholder model that has arguably pushed economic growth past the earth's limits, they will also assist in decentralizing future policymaking from an exclusive class who often aren't experts in the area. In future, prediction markets (aka betting markets) may evolve to help guide policy decision-making, known as Futarchy, or "vote values, but bet beliefs".

Both Tezos and Ethereum have considered Futarchy as a form of governance, the idea to utilize the price discovery of financial market predictions (prediction markets) to find the fair or true value of a policy decision and allow 'expert' opinions to permeate. The concept is that only investors (voters) with extra or special knowledge will stake their money in financial markets on a policy outcome, whereas the uninformed voter will not put skin in the game.

Ethereum creator Vitalik Buterin has said: "futarchy is far from utopia... however, the two important improvements that it does make are (1) making it harder for executives managing the funds to cheat both the organization and society for their short-term interest, and (2) making governance radically open and transparent."

Prediction markets such as Gnosis and Augur are another decentralized asset class of their own which will play an important role in the new decentralized economy and will be covered in a future BNC report.

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Conclusion

The structures of our organizations are changing due to technology and hierarchy flattening methods such as Agile and Teal which we see culminating in decentralized autonomous organizations.

Just as the Agile methodology has gone mainstream, decentralizing the workplace is also making its way upstream as the 'gig economy' and new software platforms enable people from across the world to work together seamlessly.

The traditional corporate structure is reaching its financial and social limits of growth and is changing from within and due to external scrutiny. Either way this imposes constraints on future shareholder returns and despite overtures to a more ESG mission, most multinational companies are not structured nor prepared to forfeit profits to stakeholders due to the historic levels of corporate debt they carry.

Sustainable and Environmental Social Governance (ESG) strategies have been recognized as a value-add to company values and the ethical investing industry is an area of future growth as a new demographic of millennial investors come to the fore with new values than the outgoing generation. We foresee DAOs coming within the category of sustainable investing in the future.

Although still the DAO concept is still at an experimental stage we expect it to influence the future evolution of the firm.

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DAO governance Asset profiles

Asset Profile: Decred

Decred (DCR) is a hybrid proof-of-work/proof-of-stake blockchain with a unique approach to network governance and decision making. The native token of the Decred digital currency network is DCR. Decred is designed to provide an alternative to bitcoin and aims to solve issues such as governance, development funding, network security, and miner centralization.

Decred's hybrid proof-of-work and proof-of-stake, in which proof of stake is an extension dependent on the proof-of-work timestamping, is based on the "proof of activity" proposal, which aims to solve the nothing-at-stake problem by having proof-of-work miners mining blocks and proof-of-stake acting as a second authentication mechanism.

Decred can't prevent forks from occurring but its PoS system can make it both extremely easy to identify the valid chain and extremely expensive to continue supporting a minority fork.

Year-to-date performance

Constituent Prices

Name	Last Price	Price USD	24H Vol DCR	Vol %
BTC	0.00312384	29.13501983	32238.99066008	65.6745%
USDT	28.82399987	28.66320058	14242.35996046	29.0133%
BNB	0.85400000	28.93275769	1153.47600000	2.3498%
KRW	34610.00000000	29.21395490	879.28769549	1.7912%
ETH	0.10675346	29.02461841	298.37831403	0.6078%
OKB	17.50000000	29.26035438	251.85220000	0.5131%
USD	27.75000000	27.75000000	24.67337930	0.0503%
DOGE	8646.35063300	29.03098689	0.04500000	0.0001%
BRL	59.00000000	15.84568133	0.00000000	0%
BCH	0.07346298	55.16373373	0.00000000	0%

Timestamp: 06/18/2019 2:24:57PM (UTC)

DCR is up ~60% year-to-date and is mainly traded in the DCR/BTC market. Its global qualified exchange volume has seen a modest increase since the start of the year, dominated by BTC (light green).

Similar to Tezos, Decred is designed to be a 'hard fork resistant' blockchain because forks, when they occur, are controlled, pre-confirmed, and agreed upon. Governance battles like 2018's Bitcoin Cash drama, are mitigated by the baked-in, open participation voting protocol of the Decred blockchain. Social media threats by bad actors are not a likely attack vector and the potential for a single consortium to dominate the network's hash rate is removed.

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Beyond the on-chain voting on block validity, proof-of-stake ticket holders can also participate in network development decisions through the off-chain voting system Politeia (that the treasury funds). Politeia is an off-chain governance platform that allows ticket holders to vote on work proposals made by ecosystem participants who want to grow the network. All off-chain voting takes place in Politeia, where anyone can create a funding proposal and have it voted on by stakeholders. The motivation of Politeia is to decentralize the treasury to stakeholders.

Decred: Inflation, incentives and intentions

- Decred aims to be **a digital store of value** similar to Bitcoin
- Decred has a thriving two sided network effect today. The demand side primarily uses Decred as **a way to store wealth and access passive income**
- In this way, Decred is very much acting as a productive asset in that holders can generate an **inflation offsetting return — 11%-12% APR today —** by participating in Proof of Stake.
- It's important to note that this figure will trend towards zero given the block reward decreases over time as the circulating supply increases

Asset profile: Tezos

Tezos (XTZ) is an Ethereum alternative blockchain platform designed to support an ecosystem of smart contract projects and Dapps. Backers of the Tezos solution include the Winklevoss twins (who include it as one of only four digital assets included in their investment portfolio along with Bitcoin, Ethereum and Zcash). Tezos founders, Arthur and Kathleen Breitman can also be considered influencers in the space

Tezos is perhaps the most ambitious and complex of the DAO projects, with its own unique delegated Proof-of-Stake blockchain that can 'self-amend' the code when the community reaches a consensus and it has an entire technical glossary of its own.

Tezos (XTZ) holders can delegate their holdings to delegates (large XTZ holders) for them to vote on their behalf - this is akin to shareholder proxy voting in governance or corporate decisions in regular companies. Large stakeholders, or 'bakers', have been compared to activist shareholders in the real world, such as Carl Icahn or other institutional investors.

Its protocol can be changed to reflect the decision making of stakeholders. Voting protocols are directly written into the Tezos code with voting operations like token staking are reflected as network operations. This is achieved via an immutable blockchain that directly bakes protocol decision making into the network's core program, circumventing bureaucracy and internal politics.

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Year-to-date performance

Constituent Prices

Name	Last Price	Price USD	24H Vol XTZ	Vol %
BTC	0.00014440	1.34678593	1008432.05863376	32.8963%
USDT	1.34321272	1.33571939	938645.01234840	30.6197%
USD	1.35051374	1.35051374	585338.29724066	19.0944%
EUR	1.19960000	1.34706147	225290.14843910	7.3492%
ETH	0.00496538	1.35001021	151758.14415584	4.9505%
KRW	1585.00000000	1.33788265	146783.49190000	4.7883%
CAD	1.75320000	1.30782337	5670.83781305	0.185%
XRP	2.98240000	1.33262197	3572.96000000	0.1166%
GBP	1.04244536	1.32776136	0.00000000	0%

Timestamp: 06/18/2019 2:24:57PM (UTC)

Tezos (XTZ) has gained ~200% since the start of the year, along with a substantial rise in global exchange volume. The XTZ/BTC pair currently makes up the majority of traded volume, however, at the start of the year it was dominated by XTZ/USD which is traded on the major exchanges Bitfinex and Kraken.

Inflation, incentives and intentions

- The Tezos project's **ultimate goal is decentralized governance** for a Dapp ecosystem
- There is a **total supply of 10 billion Tezzies** (XTZ) that can exist
- The Tezos Genesis Block issued roughly 608M XTZ, or tezzies, to roughly 32,000 accounts
- Currently, **inflation is expected to be 5% per year**
- At present, **80% of Tezos tokens are assigned for staking** (tzscan.io)

Asset profile: Maker DAO

Maker (MKR) is a utility token, governance token, and a recapitalization resource for the Maker platform, which operates as a Decentralized Autonomous Organization (DAO). Using Ethereum (ETH) as collateral, the MKR platform has been predominantly used to create Dai, a stablecoin with a soft peg to the U.S. Dollar. The Maker DAO is not too dissimilar to the original Ethereum DAO, in that it is a fund directed by stakeholders.

The Maker DAO, which currently holds around 1.59% of all ETH in circulation, which has a free float supply of US$80.28 million, uses a smart contract that backs and stabilizes the value of Dai (DAI) stablecoin through a dynamic system of Collateralized Debt Positions (CDPs), autonomous feedback mechanisms, and incentivized external actors. These external actors include keepers, price oracles, and emergency oracles. Although ETH is the only collateral

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currently accepted for backing Dai, a multi-collateral feature is set to launch later this year. Additional collateral options will be voted on by MKR holders.

Facebook's Libra model is comparable to the Makerdao ecosystem, which utilizes the DAI token as a low volatility medium of exchange and MKR as the token that allocates governance rights.

Year-to-date performance

Constituent Prices

Name	Last Price	Price USD	24H Vol MKR	Vol %
ETH	2.73513513	743.21128778	2489.26954069	77.7299%
BTC	0.07986945	743.41708455	314.15019324	9.8096%
EUR	661.87952097	743.26728913	144.04885958	4.4981%
DAI	735.07636826	726.69032302	132.42562359	4.1351%
USDT	745.22728248	741.08877455	70.80931693	2.2111%
USD	748.04945995	748.04945995	34.69918539	1.0835%
KRW	879000.00000000	742.33308000	12.24646032	0.3824%
TRY	4437.75000000	756.14098940	4.81231131	0.1503%
DOGE	245177.40541599	790.99379713	0.00000000	0%

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MKR has risen ~45% year-to-date and its qualified global volume has risen slightly in 2019. Unsurprisingly, the biggest market by far for MKR is MKR/ETH.

Inflation, incentives and intentions

- Decentralized governance of an **organization building decentralized finance through** the DAI stablecoin
- **Maker is a smart contract platform on Ethereum** that backs and stabilizes the value of Dai through a dynamic system of Collateralized Debt Positions (CDPs)
- Maker enables anyone to leverage their Ethereum assets to generate Dai on the Maker Platform
- DAI will eventually be a multi-collateral backed stablecoin and flexible in currency pegs
- MKR has a **total supply of 1,000,000 MKR**

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DAO platform assets: Aragon and DAOstack

Asset Profile: Aragon

Aragon (ANT) is an Ethereum hosted decentralized application that lets anyone create and manage a Decentralized Autonomous Organization, or DAO. The platform lets users set up features for their DAO such as cap table management, token transfers, voting, role assignments, fundraising and accounting practices.

The Aragon manifesto outlines the project's long term vision to utilize the power and security that will emerge from a post blockchain world of decentralized technologies. The Aragon platform will build organizational structures where "Sovereign individuals will be able to freely express themselves and transact with each other without any kind of intermediary exercising their unjustified power and oppressing them." Aragon's altruistic vision, and long term value proposition to empower users to build new forms of community-driven organizations has attracted sizable venture and ICO funding.

Year-to-date performance

Constituent Prices

Name	Last Price	Price USD	24H Vol ANT	Vol %
BTC	0.00006614	0.61671710	189203.77410780	72.0858%
ETH	0.00227441	0.61833370	72744.19474788	27.7152%
KRW	700.00000000	0.59101700	487.11890000	0.1856%
USD	0.64000000	0.64000000	35.10000000	0.0134%

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The ANT token is up ~55% year-to-date. Global exchange volume has been sporadic and ANT/BTC trading is the largest market, surprising given ANT is an ERC20 token.

Inflation, incentives and intentions

- To be a **digital legal jurisdiction** and trade association for decentralized and digital organizations
- **Transparent audits,** expenses and treasury wallet movements are made always public
- Monetary policy and **inflation rate** decided by ANG governance
- **Total supply of 39,609,523** ANT tokens and **circulating supply** is now equivalent
- The ANT token is used for governance operations within the Aragon ecosystem

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- Aragon community members within a DAO can perform an on-chain transaction to vote on questions or issues related to their chosen DAO

Asset profile: DAOstack

Similar to Aragon, DAOstack (GEN) is an operating system for decentralized autonomous organizations to operate within, using the analogy of being the "Wordpress for blockchains".

DAOstack is also currently operating on the Ethereum blockchain but with plans to be interoperable in the future. Its scaling solution and consensus mechanism is slightly novel, using 'Holographic consensus' which integrates prediction games into policymaking. Anyone can stake 100 GEN on the prediction of a proposal, correct predictors make profits and incorrect ones lose their stake.

DAOstack also uses a form of reputation-weighting rather than weighing votes of agents with their native token stake. Reputation is synonymous with influence power, and can form the basis for a meritocratic governance system, where those who are most appreciated - due to their past contributions - have the most influence.

Year to date performance

Constituent Prices

Name	Last Price	Price USD	24H Vol GEN	Vol %
ETH	0.00067706	0.18406862	116759.94235985	66.0651%
USD	0.18079000	0.18079000	59974.76167212	33.9349%
BTC	0.00002037	0.18954839	0.00000000	0%

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The GEN token is up ~91% year-to-date. GEN/ETH trading is the largest market, followed by GEN/USD.

Inflation, incentives and intentions

- A **circular token economy** for Dapps and DAOs
- To provide the infrastructure for **DAO cooperatives** and large scale coordinated intelligence
- **Total supply 60m** GEN
- **Circulating supply 41m** GEN

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Author Bio

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Andrew writes macro-investment research on the digital asset markets and the emerging field of token-economics with data from BNC. He also leads the Economic Analysis Working Group with the Government Blockchain Association exploring the use of blockchain in the economy, environment and society.

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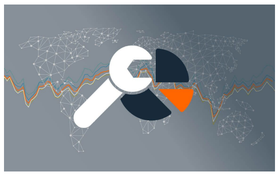

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