

Crypto

2021

# Outlook

In-Depth Industry Insights into Markets, Technology and Regulation



## About

Over the last twelve months, the cryptocurrency space has continued to develop with market movements and new innovations. Bitcoin Suisse Research examines the latest industry trends and major blockchain developments in the Bitcoin Suisse Crypto Outlook 2021, with insights into macroeconomic factors, blockchain interoperability and conversations with pioneers from the crypto and traditional finance world.

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Dr. Guil. is a researcher, entrepreneur, and software engineer. He is a serial open-source project contributor and brings 15 years of experience in the software industry and academic projects. He holds a Ph.D. in Computer Science from the University of Zürich, where he also contributed to his first blockchain project in 2013. Guil is an active technical advisor in the Swiss blockchain scene, part of the advisory board of several well-known companies. Besides being a tech builder at AxLabs, Guil is constantly on the hunt to discover and materialize the next big thing in the blockchain space.



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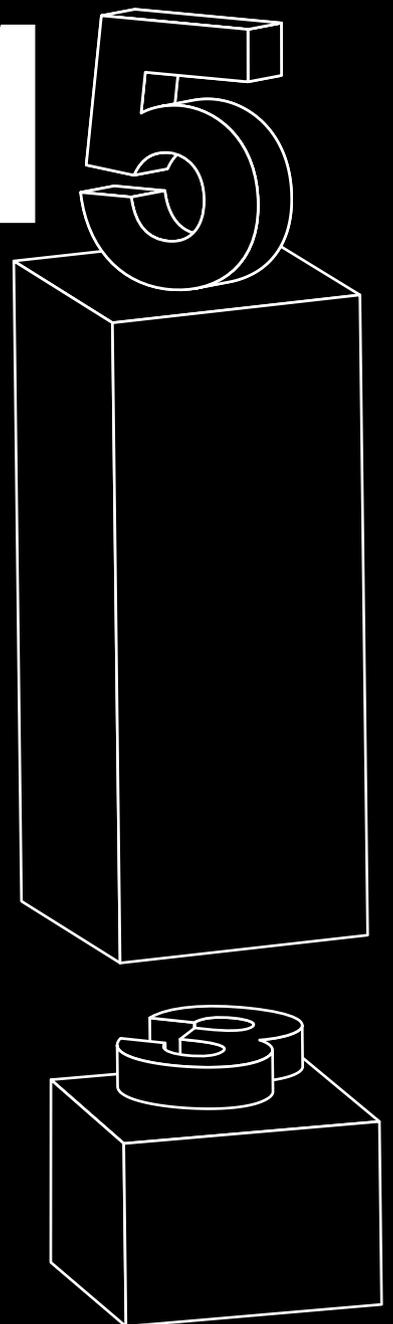
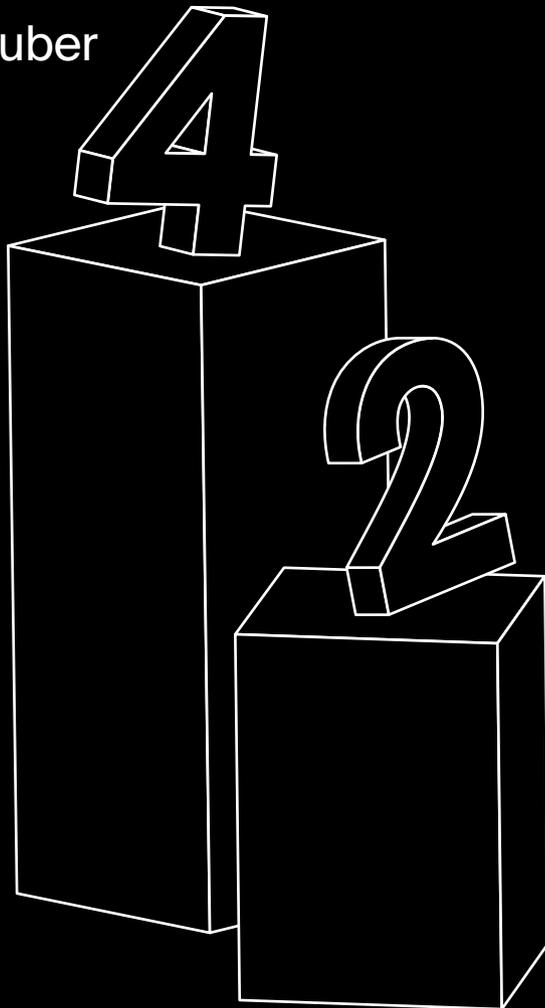
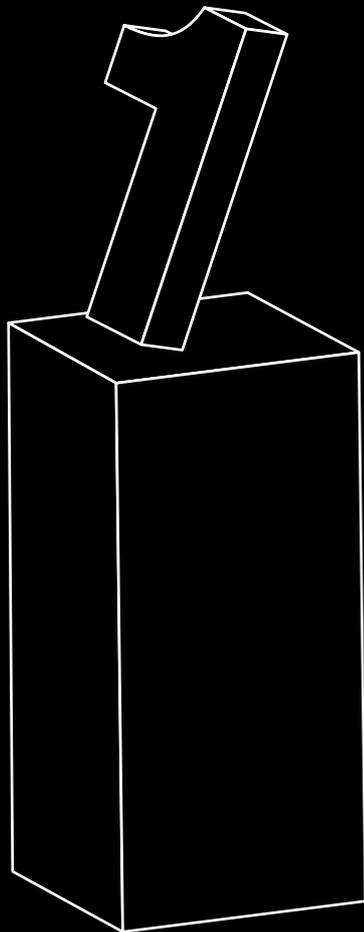
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Roger Studer was Head of Vontobel Investment Banking for decades and a global thought leader in the structured product industry. He also served as a member of the Vontobel Group Executive Board. Previously, he held senior positions in wealth and asset management as Head of Quantitative Asset Allocation at Swiss Life/Rentenanstalt and as Head of Portfolio Management and Research at ABN AMRO. He is currently Chairman of the Board of Directors of Studer Family Office AG, Vice President of the European Structured Investment Products Association (EUSIPA) in Brussels, Member of the Board of Directors of Bank Vontobel Europe AG in Munich and a member of the Board of Directors of Deutsche Börse Commodities GmbH in Frankfurt am Main.



# Mega-Trends for 2021

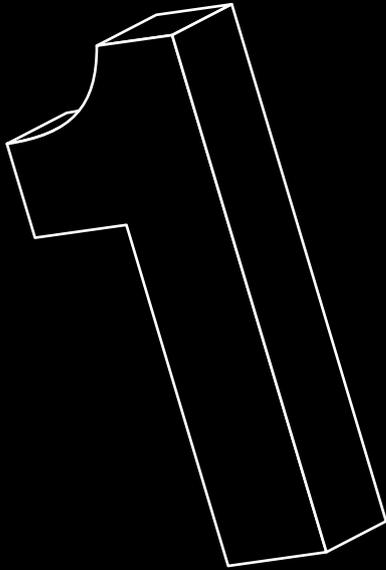
Author: Dr. Raffael Huber



The year 2020 has brought major progress<sup>1</sup> to the crypto world. The market structure has seen further improvements in terms of capacity and liquidity. Fundamental breakthroughs in blockchain technology and cryptography have happened, such as with the launch of Ethereum 2<sup>2</sup> or Polkadot, and public blockchains have found their first real product-market fit in the form of decentralized finance (DeFi)<sup>3</sup>.

This article attempts to spot and outline the next big trends – what will drive crypto markets in 2021? What will the crypto landscape look like?

- Institutional adoption of cryptocurrencies as a component in a multi-asset portfolio is set to grow.
- Ethereum 2 is likely to become the largest staking market, with implications such as the development of an ETH2 futures and higher ETH borrowing and lending rates in DeFi.
- The stablecoin market has to the potential to grow much larger but will have to comply with new regulations for the sector.
- The first Parachain Lease Offerings on Polkadot and Kusama will draw the attention of crypto investors and lead to interesting dynamics in DOT markets.
- New decentralized finance protocols will further illustrate the power of composability and – if successful – grow the space by an order of magnitude.



## Trend 1: Institutional Adoption of Crypto

“Slowly at first, then all at once” – there is hardly a phrase that better describes the swift change of heart that many prominent investors had in 2020 towards cryptocurrencies. Bitcoin has become an investable asset, and cryptocurrencies as an asset class which outperformed other asset classes by a fair margin can no longer be ignored. The default question for portfolio managers seems to be switching from “Why should I invest in Bitcoin?” to “Why shouldn’t I invest in Bitcoin?”.

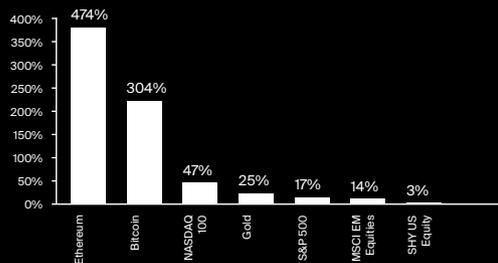


Illustration 1: Cryptocurrencies have outperformed other major asset classes by multiples in 2020. Bitcoin has returned over 300%, whereas Ether managed to get close to 500%. Source: coingecko.com, Yahoo Finance, Bitcoin Suisse Research.

Among the first ones to make their investment public was Paul Tudor Jones, who wrote about it in his investor letter<sup>4</sup> in May 2020 and allocated a low single-digit amount to Bitcoin as a hedge against inflation. Others, such as Stanley Druckenmiller<sup>5</sup> or Black-Rock’s Rick Rieder<sup>6</sup>, followed later with positive statements or allocations towards Bitcoin. It is reasonable to assume that this trend continues in 2021 and more investors decide to allocate to Bitcoin both strategically and tactically.

“[Bitcoin] scores 66% of gold as a store of value [in our internal assessment], but has a market cap that is 1/60<sup>th</sup> of gold’s outstanding value. Something appears wrong here and my guess is it is the price of Bitcoin.” – Paul Tudor Jones

On top of that, a few companies started to use Bitcoin as a treasury reserve asset. At the time of writing, around 100’000 BTC (or about 0.5% of the supply) are held by publicly traded companies<sup>7</sup>, such as MicroStrategy<sup>8</sup> (70’470 BTC), Galaxy Digital (16’651 BTC) or Square<sup>9</sup> (4’709 BTC). Another massive amount of BTC is held by the Grayscale Bitcoin Trust, which now owns close to 600’000 BTC (or about 2.7% of the supply) and has experienced rapid inflows in 2020, probably not least due to arbitrage between Bitcoin spot markets and the GBTC premium<sup>10</sup> of up to 40% to its net asset value.

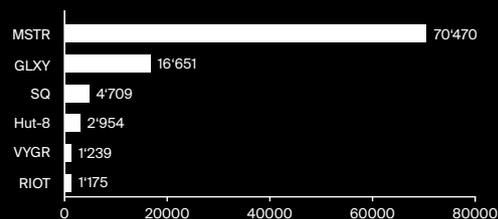


Illustration 2: Of all publicly traded companies, MicroStrategy (MSTR) has allocated most aggressively towards Bitcoin and now holds more than 70’000 BTC, purchased for a total of \$1.125 billion. Source: bitcointreasuries.org, Bitcoin Suisse Research.

The reasons for an investment into Bitcoin and other cryptocurrencies vary. An often-cited reason is the current and future macroeconomic environment, in which cryptocurrencies are ideally placed, as outlined in the dedicated article on “Macroeconomics in Covid and after: the Perfect Storm for Cryptocurrencies” by Giles Keating. Bitcoin is also seen as an alternative and challenger to gold, and cryptocurrencies in general as a bet on the future importance of blockchain technology in the world.

**“Do I think it will take the place of gold? Yes I do, because it’s so much more functional than passing a bar of gold around.”**

– Rick Rieder

Additionally, the regulatory environment for cryptocurrencies is becoming clearer and provides the necessary legal certainty for investments into the asset class. Professional custody is largely a solved problem, and sophisticated trade execution techniques enable even larger investments. Following positive remarks<sup>11</sup> from the CFTC Chairman Heath Tarbert about Ethereum, the CME will also launch ETH futures<sup>12</sup> in February, which will further improve market access beyond Bitcoin.

Recently, S&P Dow Jones Indices also announced<sup>13</sup> that they would create indices for various cryptocurrencies. This might lay the groundwork for a long-awaited Bitcoin ETF, applications for which have so far always been declined by the SEC, mainly due to price manipulation concerns. A trusted price source might alleviate these concerns.

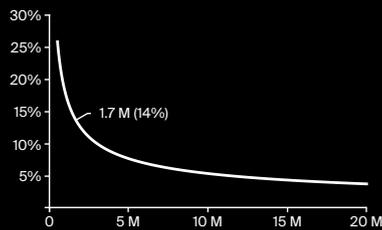
Another implication of institutional adoption of Bitcoin and other cryptocurrencies is that correlations to other asset classes might increase in the future. The holder structure of cryptocurrencies currently still differs significantly from that of other asset classes, which likely plays a role in the uncorrelated nature of the asset class. As cryptocurrencies are more regularly included in multi-asset portfolios, the correlation to other assets in

such portfolios might increase due to rebalancing and more stringent risk management considerations.

## Trend 2: Ethereum 2 and Staking

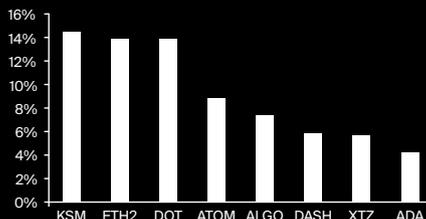


The Beacon chain of Ethereum 2 was finally launched on December 1 and represents a seminal achievement for blockchain technology. This is the first stage<sup>14</sup> (or Phase 0) of a full deployment of Ethereum 2 and brings the possibility to stake ETH to earn staking rewards. These rewards depend on the overall amount of staked ETH in the network (the formula can be found here<sup>15</sup>); currently, around 1.7 million ETH were sent to the deposit contract<sup>16</sup> for the beacon chain, resulting in an approximate staking reward of 13.6%. This reward is denominated in ETH, so any effective returns in USD (or EUR, CHF) highly depend on the ETHUSD price.



*Illustration 3: Ethereum 2 staking rewards start out relatively high at >20% and drop off rapidly towards ca. 3% as more ETH gets staked. At the time of writing, rewards stand at circa 13.6%. Source: GitHub, Bitcoin Suisse Research.*

ETH is set to become a dominant player in the staking landscape – it will be by far the most valuable proof-of-stake blockchain, and staking returns compare well to other stakeable currencies.



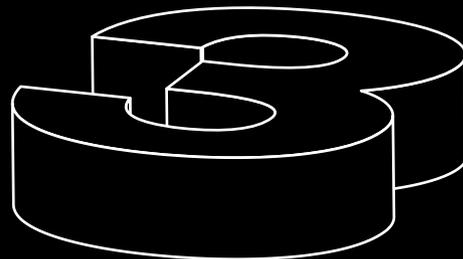
*Illustration 4: The highest staking rewards are currently available for KSM (14.1%), ETH2 (13.6%) and DOT (13.5%). Source: stakingrewards.com, Bitcoin Suisse Research.*

At the moment, however, and until later phases of Ethereum 2 enable transfers of the cryptocurrency on the new blockchain, staking ETH represents a vote of confidence in the development of Ethereum and comes with an unknown lockup period. The Ethereum staking equilibrium will only fully establish, and the market grow to its real size, once full convertibility is enabled. Whether or not that happens in 2021 is yet unclear. An additional consequence of large ETH lockups might be increased volatility in all ETH markets, as liquid ETH gets deployed for staking instead.

In the early stages of Ethereum 2 staking, an ETH2 futures market might also develop. Investors in this market will likely demand a liquidity premium<sup>17</sup>, and ETH2 futures might trade at lower prices than ETH due to the lockup period. Additionally, markets for

converting staked ETH to liquid ETH might develop both in centralized and decentralized manner – in this case, the conversion rate between the two variants does not need to remain at 1:1 (this rate is only ever guaranteed one-way for ETH to ETH2 through the deposit contract), and the degree to which de-pegging from 1:1 happens could serve as an indicator of perceived counterparty risk (either of a smart contract or a centralized service provider).

As more ETH gets staked and rates start to stabilize, this will also have an impact on yields on ETH in DeFi. Currently, the lending and borrowing rates<sup>18</sup> for ETH stand at ca. 0.1% and 2% – over time, these should see a moderate increase towards the rate of staking rewards, or more precisely: towards the expected average staking rewards rate until transferability minus the costs of running an ETH2 validator (accounting for the tail risk of getting slashed). The presence of more tokenized Bitcoin on Ethereum (such as wBTC) could accelerate this process, as Bitcoin can serve as collateral in DeFi lending protocols to borrow ETH, stake it, and earn staking rewards. Similar mechanisms could unlock for other proof-of-stake chains should they either develop an own DeFi ecosystem or build a bridge to the existing one on Ethereum.



### Trend 3: Stablecoins

Stablecoins have had a phenomenal year in 2020. The total stablecoin supply grew from ca. 5 billion to more than 25 billion, and they represent an important interface between the fiat currency world and the crypto ecosystem.

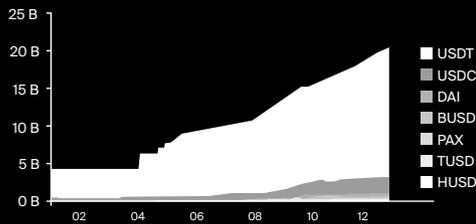


Illustration 5: The total supply of stablecoins grew significantly in 2020. Tether (USDT) remains the market leader with ca. 80% market share. Source: coingecko.com, Bitcoin Suisse Research.

The majority of the stablecoin supply is on Ethereum. One catalyst for this increase has been the DeFi hype during the summer, where high yields,<sup>19</sup> often >100% p.a., were available for providing USD stablecoin liquidity to protocols. This led to high demand and an inflow of capital to the space. Stablecoins pegged to the USD remain extremely dominant, and stablecoins pegged for example to the EUR have a negligible market cap. This may change in the future – in principle, the building blocks available in DeFi could be customized to allow for efficient forex trading. Demand might come, for example, from arbitrageurs that operate in the (fairly liquid) BTCEUR or ETHEUR pairs on centralized exchanges, or – in the long run and depending on the competitiveness of exchange rates – commercial and speculative forex traders. If such demand arises, so will the supply of non-USD-pegged stablecoins.

There might be regulatory headwinds coming for stablecoins, though. As governments and central banks around the world gear up for the launch of their own central bank digital currencies (CBDCs) in the wake of the inefficiencies in the current financial infrastructure exposed by the pandemic, privately issued stablecoins will receive more regulatory attention. As a first mover in the CBDC space, China has already banned<sup>20</sup> private stablecoins backed by the Renminbi. The EU has proposed<sup>21</sup> regulations that would also affect stablecoins<sup>22</sup> and while the U.S. is exploring<sup>23</sup> a digital currency as well, no clear direction for private stablecoins has been given so far. How large the initial backlash can be was demonstrated by Libra (now Diem), which will launch<sup>24</sup> in the first half of

next year with a minimal version and a simple USD-pegged stablecoin. Over the next decade, however, privately issued stablecoins that are convertible to CBDCs through intermediaries might still become the go-to interface between CBDC ledgers and public blockchains.

## Trend 4: Parachain Lease Offerings on Polkadot and Kusama



Polkadot launched<sup>25</sup> its long-awaited mainnet in May 2020, and shortly after that handed over governance of the protocol to the community. Polkadot is set to become an important player for blockchain interoperability – a topic more closely described in the dedicated article “Interoperability: Where are we now and what can we expect for 2021” by Fatemeh Shirazi.

Polkadot’s architecture (and that of its “canary network” Kusama) includes a relay chain and parachains. Parachains are customizable blockchains for each use case, such as high transaction throughput or strong privacy. The relay chain enables pooled security guarantees: Instead of securing each parachain individually, this duty can be outsourced to the relay chain, which improves the capital efficiency and likely reduces the overall required security budget.

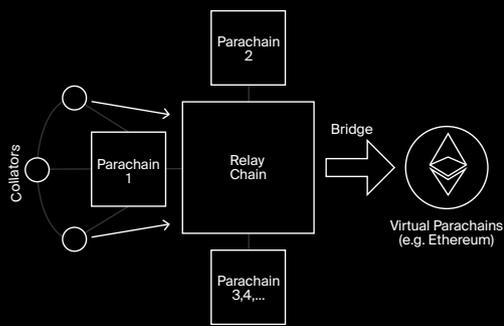


Illustration 6: Simplified depiction of Polkadot's architecture. The relay chain sits at the center and coordinates with various parachains through the help of collators. Other blockchains can be attached through bridges. Source: Polkadot Whitepaper, Bitcoin Suisse Research.



## Trend 5: Growth of Decentralized Finance

2020 was the year of DeFi – many projects that were quietly building over the past three years have exploded in popularity, which was best seen in the skyrocketing<sup>29</sup> total value locked (TVL) in various DeFi protocols.

Projects looking to become a parachain of Polkadot will need to lock up DOTs, Polkadot's native coin, for 6 to 24 months. This lock-up is in direct competition to the staking of DOTs, which currently yields around 13.5% annually (denominated in DOT). However, the economics of staking in Polkadot are designed in a way to encourage<sup>26</sup> – as soon as parachains go live – a 50% staking rate of the total DOT supply, such that up to 50% of DOTs are available for parachain lock-ups.

Parachain slots are assigned in candle auctions,<sup>27</sup> where interested parties can bid on the slot; in the medium term, there will likely be up to 100 slots available. Since projects looking to become a parachain will often lack the required DOTs, they can look to crowdsource<sup>28</sup> these from other DOT holders and conduct a Parachain Lease Offering (PLO). This will require incentivization, for example in the form of tokens, that can make up for the forgone staking rewards.

PLOs will likely receive a lot of attention in 2021, both on Polkadot and Kusama. The returns that participants in the first few PLOs obtain might help in the economic incentive design for later offerings and will serve as an indication how they relate to the staking rewards rate. In principle, the game theoretical equilibrium for returns (in DOT) should lie slightly above the staking rewards rate, accounting for the longer lock-up period (at least 6 months in PLOs, 28 days for staking), project-specific execution risks, and the absence of slashing risk.

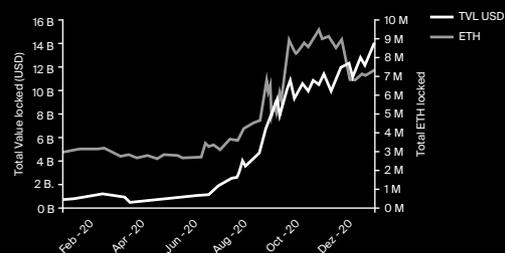


Illustration 7: The total value locked in DeFi protocols continues to rise, and currently, more than 7 million ETH are deployed across various protocols. Source: DeFipulse.com, Bitcoin Suisse Research.

This trend is likely to continue in 2021 – however, as mentioned above under Trend 2, DeFi protocols will have to compete with ETH staking for liquid ETH. Still, expansion of the DeFi universe through introduction of new projects happens quickly and will continue to attract liquidity for as long as yields remain high, or whenever composability between protocols opens up new possibilities.

One area that seems underexplored so far is DeFi derivatives. There are early exam-

ples<sup>30</sup> of interest rate swaps that would allow to trade floating rates (which are the norm in DeFi) for fixed ones – which is currently only possible through centralized platforms that offer both perpetual swaps (which come with a variable funding rate<sup>31</sup>) and futures contracts (with a fixed annualized premium or discount upon opening a position). Similarly, various protocols<sup>32</sup> aim to capture the on-chain options market.<sup>33</sup> Such upcoming derivatives platforms will likely battle for liquidity through governance tokens and liquidity mining.<sup>34</sup>

What really sets DeFi apart from traditional financial infrastructure, though, are the immediate composability benefits that new projects gain. In DeFi, a structured product might be just a “zap”<sup>35</sup> that, for example, simultaneously trades various options and futures in a single transaction using multiple protocols. A layered infrastructure is forming, with lending and borrowing platforms (such as Maker, Compound or Aave) and decentralized spot exchanges (such as Uniswap) as the base layer upon which others can build and innovate in a permissionless fashion.

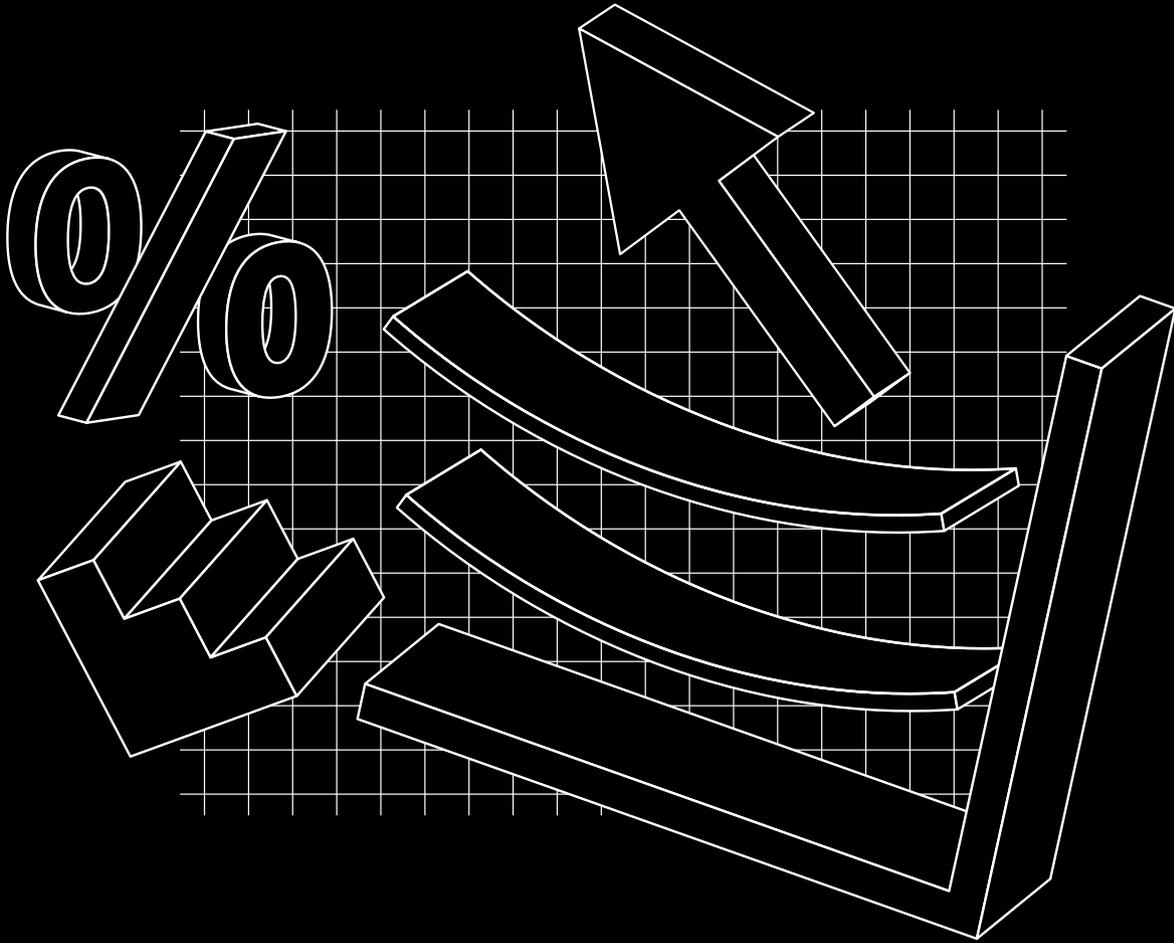
The yields in DeFi on USD stablecoins can be thought of as the value of the dollar in the crypto ecosystem (plus smart contract risk, especially for the newer projects), or - to draw an analogy to traditional terminology - as the implied cross currency basis of crypto-dollars against the dollar. An indication for that has existed long before DeFi took off, in the form of centralized USD borrowing and lending markets, as well as in the futures contango or backwardation, which enables yield generation from cash and carry trades. Historically and perhaps naturally, these yields increased during bull markets and decreased during bear markets. In the long run, however, as capital flow to crypto becomes even easier, the trend for those yields should be downwards and closer to traditional USD interest rates.

Last, but not least, as limited transactions throughput on the Ethereum chain imposes some restrictions on the use of DeFi due to high gas fees and hence transaction costs, a migration to layer 2 solutions might happen – Synthetix is an early adopter<sup>36</sup> in the space and

will use the layer 2 solution Optimism in the future. As a partial migration of some protocols might fracture the ecosystem and reduce composability, it is likely that this migration takes longer than expected as layer 2 solutions prove themselves stable and secure, but then happens quite rapidly once it starts.

## Conclusion

The year 2021 is set to be exciting on all fronts – from broader recognition of cryptocurrencies as an asset class to fundamental advances for blockchain technology. New components of the ecosystem, such as Ethereum 2 and staking or Polkadot’s Parachain Lease Offerings, will allow to observe the game theory behind them unfold in real time in the markets. The “crypto experiment” is slowly maturing and transforming into a powerful ecosystem that can disrupt what is viewed as a store of value, how the financial infrastructure is constructed and how efficient and elegant business processes could be in the digital age.



# Macroeconomics in Covid and after: the Perfect Storm for Cryptocurrencies

Author: Giles Keating

- The global debt explosion raises longer-term inflation risk, and Bitcoin is increasingly seen as a credible hedge against this
- Negative yields move out along the credit and duration curves, enhancing the allure of cryptocurrencies
- Central bank digital currencies start to appear, and may potentially have a positive interaction with private cryptocurrency ecosystems

## Introduction

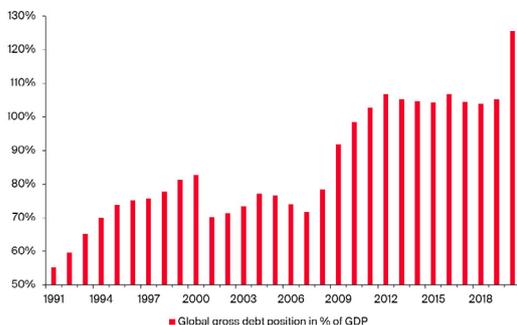
The Covid crisis has caused great macro-economic upheaval: soaring budget deficits and government debt, accompanied by new rounds of monetary easing on top of already ultra-easy stances. Alongside, there have been major structural changes: a surge in online shopping and supporting infrastructure, ranging from delivery logistics to body-scanning apps for clothes purchases; declining use of cash and a new round of pressure on many banks; a new phase of the tech cold war, as China races to develop its own world-beating chips; and an extraordinary change in travel and work patterns, evidenced in the collapse in flights, the boom in video calls, and the pop-up of cycle lanes across the world's cities.

Cryptocurrencies find themselves at the heart of this upheaval, reflecting the features hard-wired into them by their creators. Bitcoin's pre-determined path towards a future fixed supply stands in stark contrast to the unlimited potential to expand conventional currencies; newer cryptocurrencies offer functionality and earning power undreamt of in old-fashioned money; and central bank digital currencies, a year ago of little more than theoretical interest, have quite suddenly started to become a reality, in a way that may yet make them the perfect complements, rather than competitors, to their private counterparts. 2021 starts with a "perfect storm", in which these fundamental characteristics of cryptocurrencies interact with the macro and sectoral effects of Covid, to broaden their appeal far beyond the early enthusiast base, out to a broader and growing range of private and institutional investors.

This article is structured to consider in turn how each of the main macro and sectoral effects of Covid interacts with cryptocurrencies, at the end drawing the different areas together into a whole that is greater than the sum of the parts.

### Macro – soaring debt, monetary ease, and what about inflation?

Developed-economy government debt at the end of 2020 is now estimated at 125%. (IMF figures, gross basis). That is based on figures published last October, when the full extent of the second wave of Covid had not become apparent, so the eventual figure is likely to be higher.



*Illustration 1: Global debt has exploded in 2020 and now stands at around 125%. Source: IMF, Bitcoin Suisse Research.*

To give some historical context, the figure was 70% twelve years ago, just before the financial crisis, by the end of which it had lurched up to around 106%. After that, virtually no progress was made in reducing this debt burden, and so the effects of the Covid crisis and the financial crisis compound together.

The debt burden varies widely across countries, of course, with the US at 131% and Japan more than double that, while Germany is at 73% and Switzerland just below 50%. These figures would be lower, if government assets are netted off, and substantial portions of this debt is now held by central banks. Nevertheless, the big picture is clear: government debt was already very high before Covid, and it has soared as a result of the virus. The surge represents partly the lost tax revenue and increased benefits that operate automatically in a recession, and partly new measures to counter the economic weakness. There can be some improvement as the economy recovers, but it will be a grinding and slow process, and there are few signs of the political will to take the hard decisions

needed to bring it down faster.

Yet, the risk that this extraordinary debt surge becomes dangerously unsustainable lies in the future; for now, it seems almost benign, and the reason is that the cost of debt service has barely risen or has even fallen, as a result of the parallel policy of ultra-easy money. Central banks around the world have abandoned the tentative steps towards tightening underway before the crisis and instead embarked on new rounds of easing. Zero or negative rates are now the global developed economy norm, and even many emerging countries have astonishingly low rates; quantitative easing has been expanded, not only in size but also in scope, with central banks buying assets that would have been unthinkable a few years ago, ranging from equities (Japan), to derestricted quantities of peripheral-economy bonds (Europe), and corporate and junk bonds (US).

These monetary measures have been highly successful in supporting asset prices, driving equity market multiples to high levels and compressing credit spreads. This has undoubtedly helped to minimise the depth of the Covid economic slump, but at the cost of over-valuing some assets in ways that inevitably distort resource allocation. For consumer good prices, it has probably helped to mitigate the risk of deflation, we don't really know, but it clearly has not yet created an inflation.

And, this lack of inflation is just as well, for anything more than mild inflation could face central banks with an unpleasant dilemma: either they tighten policy (pushing rates up and ending asset purchases), which would trigger an economic downswing and raise the cost of servicing the debt mountain; or, they pretend the inflation isn't happening, which works for a while until they lose credibility and bond yields then soar out of their control – unless they impose “financial repression”, with exchange controls and/or rules that force domestic investors to buy government bonds at low yields, effectively a confiscatory wealth tax.

So, how likely is the risk of such inflation? At present, not very likely, due to the slump in demand caused by Covid. And there is certainly a good chance that this slump will

be followed by a gradual economic recovery, allowing central banks to start gently tightening policy over a period of several years, keeping inflation under control and avoiding the extreme scenarios just mentioned. But there are also darker scenarios. The “scarring” from Covid, with lower-skilled and older people driven out of the workforce and companies bankrupted, reduces economic capacity and may run the economy into the inflationary buffers much earlier than expected, unless countered by well-targeted re-training programmes. The move towards more nationalism in politics, and the new Cold War between the US and China, may encourage uncompetitive oligopolies that can push up prices easily – the recent anti-trust action against the Google ad-monopoly appears to go against this, but has yet to be shown to have real teeth.

The bottom line is that we just don’t know how big is the risk of an inflation large enough to tip the debt mountain from benign to deadly – all we can say is that it’s a much bigger risk than it was before Covid.

#### **Bitcoin in an era of debt and inflation:**

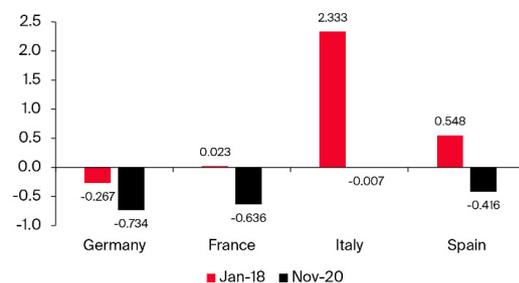
Bitcoin could have been designed as the perfect asset to protect investors from this debt-inflation spiral – and indeed, the need for such an asset does appear to have been one of its original inspirations. Because the supply of additional Bitcoin rises at a reducing rate and eventually stops, it is hard-wired to have a deflationary bias that no fiat currency could ever have. Provided there is ongoing demand to hold Bitcoin, as an investment and/or transactions asset, that has at least a loose positive correlation to overall nominal global GDP, then both real economic growth and inflation will, over time, create a tendency for its trend price to rise. And the risk of “financial repression” mentioned above could add an extra impetus to this, for Bitcoin holdings, whether permitted or not permitted under dystopian future scenarios, could be difficult to detect.

Gold has traditionally been the asset held by investors concerned about runaway debt and inflation, but interestingly, it was the “dog that did not bark” in 2020, with its prices

showing little strong uptrend in a year when cryptocurrency prices, though volatile, did trend upwards. One prosaic reason for that is that global jewellery demand has been weak, for a number of reasons, notably the decline in formal weddings in India and elsewhere; central bank demand has also been weak, for reasons that are not clear. But another key reason for the divergence between gold and cryptocurrency prices is that gold not only pays no interest, but actually costs money to hold. By contrast, cryptocurrency holdings can be used to generate substantial income, and we now turn to consider this.

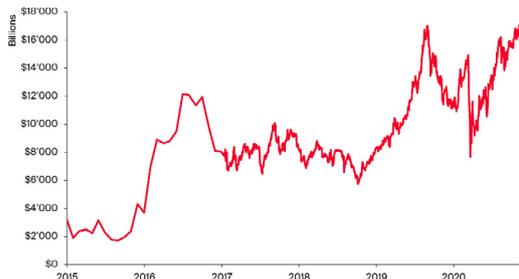
#### **Zero interest rates, the positive yield on cryptocurrency holdings, and the future of conventional banks:**

While near-zero or outright negative interest rates were already part of the “new normal” when Covid struck, the monetary policy response to the virus has intensified their effect in a major way. In countries such as Switzerland, some banks have lowered the thresholds on which they charge depositors interest, but more profoundly, and globally, the action of the US Federal Reserve and others in buying investment grade and junk-rated bonds has compressed credit spreads. The result is that in many currencies, it is now barely possible to earn positive yields on fixed-income portfolios even by taking substantial credit and/or duration risk. Even emerging market debt portfolios now offer yields that would in the past have been associated with currencies such as the Euro or Swiss Franc.



*Illustration 2: Earning a positive yield on fixed-income portfolios is barely possible, even by taking substantial credit and/or duration risk. Source: investing.com, Bitcoin Suisse Research.*

One stark illustration of the problem now faced by fixed income investors is that 26% of the market capitalisation of debt globally, over \$17 trillion, now has a negative yield.



*Illustration 3: Over \$17 trillion is invested in negative yield-bearing assets (November 2020). Source: Bloomberg Barclays Global Aggregate Negative Yield Debt Index, Bitcoin Suisse Research.*

This new lurch downwards in the ability to earn positive yields on mainstream portfolios has coincided with income-earning developments in the cryptocurrency space, long in the pipeline, that became a reality in 2020. Holders of some smaller cryptocurrencies can already earn income from staking and from transactions fees, and Ethereum 2 looks set to join the ranks in the near future. Because this staking/fee income is available to any holder, without the need for the computing power needed to validate transactions under the proof-of-work system used in Bitcoin and Ethereum 1, it quite suddenly creates a new incentive for any investor to hold cryptocurrencies. In parallel, decentralised finance (DeFi) transactions, including lending, that allow holders of a wide range of cryptocurrencies, including Bitcoin, to earn (further) income, has gone from a theoretical possibility to a reality, albeit initially on a small scale.

The potential is for both staking/fee and DeFi income to grow over time, possibly very rapidly, reflecting rising volumes of real economy transactions, both by retail consumers and in the business to business area, and also financial transactions. The jump in the price of Bitcoin and other cryptocurrencies when PayPal announced their availability on its platform, albeit with initially restricted transferability, demonstrated investors focus on this issue.

The combination of staking/fee and DeFi income allows holders of a cryptocurrency portfolio to potentially earn high single- or low double-digit percentage income. This is highly appealing in a zero-interest world. Especially combined with supply either being strictly limited, as in the case of Bitcoin, or for other cryptocurrencies set by pre-determined rules, which in some cases are linked to transactions volumes (as is proposed for Ethereum). As this yield potential on a limited-supply asset has become apparent to both family offices and institutional investors, it is unsurprising that the universe of cryptocurrency holders has rapidly started to broaden out from the earlier enthusiastic pioneer core, supporting demand.

One way of thinking of this income is that it gives to cryptocurrency holders the profits and wages that accrue to shareholders and employees in a conventional banking system. In this sense, a cryptocurrency is a kind of co-operative, with users both paying to use it (explicitly via fees or implicitly via currency creation), and receiving income from its use. The corollary of this is that cryptocurrencies pose an existential threat to the existing business models of conventional banks and, perhaps to a lesser extent, payments providers. The current world of zero interest rates, compressed credit spreads and flat yield curves adds to this pressure, since banks traditionally made their profits by intermediating credit and through asset-liability maturity mismatch. 2020 saw reports suggesting that, for the first time, a merger between the two biggest Swiss banks might now be a serious possibility. While the outcome of any particular negotiations cannot be predicted, the structural pressure for consolidation, and for focus on client-facing activities that cannot be replaced by decentralised blockchain transactions, suggests that a new wave of mergers could appear in a number of countries before long.

### **Central Bank Digital Currencies.**

Another development in 2020 has been the acceleration of activity by central banks in provision of digital currencies. China launched a digital Yuan, initially to a trial group of users, Singapore followed suit later in the year, and while other countries have made no commitment, periodic comments have suggested that a topic that was merely the subject of working groups and discussion papers early in the year, may be moving rapidly up to the decision-making boards. Reasons for this could include the rapid spread of cashless transactions during Covid, as well as the desire of the central banks to provide a secure and strong anchor for the rapidly growing technologies centred around cryptocurrencies. Another intriguing possibility is that central bank digital currencies could be used for extraordinary monetary policies previously possible only in economic theory, such as a “helicopter drop” of extra money to all holders, or its opposite, the imposition of negative rates on everyone – though the latter might be seen as confiscatory, and undermine public confidence in the new money.

Many open questions remain about these central bank currencies, notably (i) whether they will be available only to intermediary institutions, direct to the public, or a hybrid that allow public holdings with access via an intermediary; (ii) whether central banks will allow private stablecoins denominated in their local currency (such as DAI for USD or Facebook’s multi-denomination Libra) to circulate in parallel with their official digital currencies; and (iii) what the relationship between the central bank digital currencies and independent cryptocurrencies such as Bitcoin might be. The Chinese version may or may not turn out to provide a model followed elsewhere, but for the record, on these three key features: (i) it is a hybrid; (ii) private stablecoins are outlawed; and (iii) the extent of its interaction with the full range of cryptocurrencies is not yet clear, and may well evolve over time.

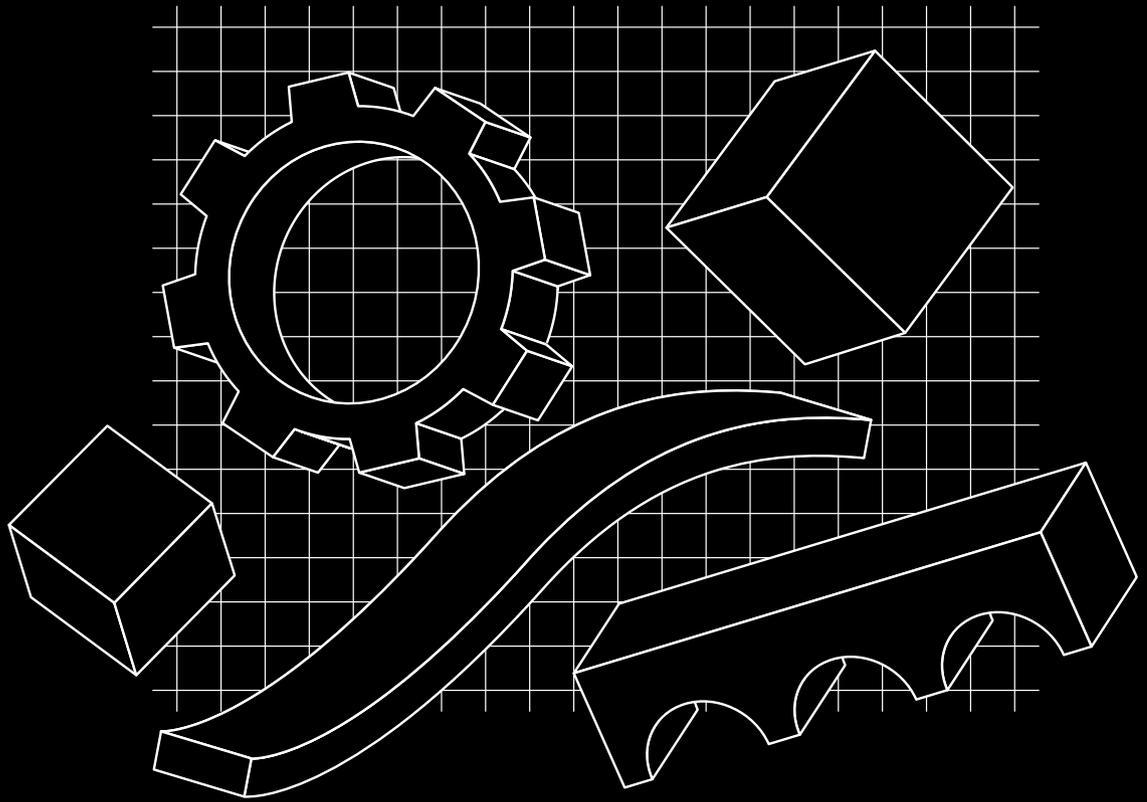
And, it is the third issue that is most important for the future value of Bitcoin and other cryptocurrencies. There is a possibility that central banks might try to create some

kind of total separation. However, this would stymie the development of the technology, since it seems unlikely that the central banks would allow features such as broad DeFi to be developed using their own digital currencies, indeed it is challenging to see how this could be made compatible with the security and control that is clearly needed for an official unit. It therefore seems more likely that the central banks will allow interaction, perhaps limited at first and then broadening, so that the full potential of both decentralised finance and also direct real economy applications such as supply-chain management can be developed using the cryptocurrency units. This scenario would likely be positive for cryptocurrencies, since they would become clear complements to the official digital currencies, allowing the operation on public blockchains of services such as lending, capital issuance, and the tracking of and paying for the online purchases that have boomed during Covid. As such real and financial transaction volumes grew, they would tend to put upward pressure on the prices of cryptocurrencies.

## Summary

The Covid crisis has turned out to be a perfect storm for cryptocurrencies. The threat of future inflation from the explosion in government debt remains far beyond the visible horizon, yet it has clearly risen as budget deficits have soared and monetary policy has been eased, and this provides an anchor justification for an increasing pool of investors to hold cryptocurrencies, but especially Bitcoin due to its tightly limited future issuance. More immediately, the intensified monetary easing that has spread the “zero rates” mantra out across the credit and yield curves has coincided with the arrival of income-earning possibilities from staking, fees, loans and DeFi, especially on the new small-cap cryptocurrencies and the upcoming Ethereum 2, and the potential for high single or low double-digit earnings

is clearly drawing in many new investors. Alongside this, the potential for growth in real-economy transactions, initiated by providers such as Worldline and given prominence by the PayPal move, could be given enormous impetus if the current moves towards central bank digital currencies allow interaction with existing cryptocurrencies, whose operation of digital banking and real economy supply chains would make them the heart of the world’s new digital workshop.



# Interoperability

Where are we now  
and what can  
we expect for 2021?

Author: Fatemeh Shirazi

In this article, we investigate interoperability in the context of blockchain technologies. After a short definition of interoperability, we review why interoperability is relevant for the blockchain ecosystem and which benefits we can expect from getting to a state where numerous sovereign blockchains can seamlessly interact with each other. We summarize existing technologies and then illustrate what developments to expect from 2021. We conclude the article with open challenges and some questions regarding interoperability between the decentralized and centralized worlds.

## Definition and Problem Statement

A blockchain's consensus decides the canonical history of which transactions happened and ensures that these transactions are valid. However this transaction history is only directly visible to its own ecosystem. Interoperability between two blockchains refers to one or both chains being able to understand the history of the other chain. This can be used for token transfers for example, where token holders of a chain can exchange their token for a token of another chain.

In the fiat world when an exchange between two currencies happens, the correctness of the foreign currency is either checked physically when bills are exchanged or confirmed by financial institutions with a reputation and insurance schemes. In the blockchain world, particularly in the context where a transaction is only finalized within an hour or ten minutes, how can the recipient of an exchange know that they have not been defrauded without trusting some third party?

### Setting the stage:

#### Why do we need Interoperability?

During many millennia of human history, we have lived in a multi-currency world, where the money is issued by several nations (or unions of nations). As this is true for the centralized world, we can observe a similar phenomenon in the emerging, decentralized world; thousands of blockchain projects have launched and operate using their native tokens.

However, the reason for having multiple currencies is different and contrasts in important factors: While most centralized currencies are issued and sustained as a pillar of power and influence, decentralized currencies are optimized to serve the individual blockchain's purpose. Additionally, most decentralized currencies differ from their centralized predecessors in other important properties: They are designed to make participation fairer and more inclusive and reduce the differences of issuance across countries, e.g., by excluding central banks. Those desired properties are held in check by their decentralized and borderless nature and the fact that users can freely choose which digital currencies they prefer.

A world with multiple digital currencies is inevitable because many different tokens serve a distinct purpose and are specialized for various services. A famous example is Bitcoin, which is the first successful blockchain application that is designed to be a decentralized currency or store of value. While it provides considerable security and stability, important properties of a currency, it lacks scalability and flexibility. To include

those properties, Ethereum first launched in 2015 and introduced smart contracts that allowed high flexibility for a rich range of applications. However, Ethereum cannot solve the scalability problem and the costs of running applications are getting higher the more it grows. For example, for a simple transaction, the fee is about \$0.371, and to fill a whole block, it would be \$140.448 and fees were much higher during the recent DeFi bubble<sup>2</sup>. While Ethereum has plans to upgrade its protocol towards Eth2 to solve its scalability problem, there is no near future hope for reaching that goal. This example shows that there are fundamental trade-offs between important properties and blockchains that excel in a few distinct features.

If a user wants to benefit from different platforms today, they are required to hold all involved tokens and swap between them. This means a user must go through centralized (or decentralized) third-party exchanges, which may incur significant costs in terms of time, trust, inconvenience and barriers to entry. Additionally, the process is tedious and complicated and reduces usability significantly. True interoperability between chains would make this obsolete and work in the background and thereby **reduce friction**. Interoperability will make connected blockchains effectively one ecosystem, **reducing the costs of lock-in** when deciding which chain to use. True interoperability would allow assets on one chain to derive value from being used on another and applications on different chains to interact.

Another important reason why interoperability is required is the fact that some **business ideas require communication** between multiple protocols. For example, let us assume that a travel agency wants to book a trip for a customer. This travel agent needs to book a flight, some insurance, accommodation, and maybe a car rental. However, getting good deals and availability is not always trivial. The ideal case is that either all these items get booked definitely together or none does. If all these items need to be booked from different chains that are not interoperable, the delay could jeopardize the booking. In the analog world, delays in settlements are fixed with insurance. In the decentralized world, while the flight might be finalized, it would be unclear whether the hotel can be finalized too. True interoperability can bridge those individual applications and leverage the distinct benefits of them all.

To summarize, interoperability is required to reduce friction in changing between the different tokens/currencies, which leads to wide-spread adoption and innovative business ideas: Cross-chain oracles, Payment versus payment or delivery, Portable

assets, Asset encumbrance, and Cross-chain contracts<sup>37</sup>. Interoperability between chains is also useful for achieving reliable communication across chains. By creating services to make collaboration between different chains easy, decentralized currencies can compete with and surpass fiat currencies.

### Interoperability Solutions for Token Transfer Between Chains

There have been multiple solutions introduced for realizing interoperability, in particular token transfer as follows.

**Exchanges** allow trading a token from one chain with tokens from another chain. They either could be realized using a) notary schemes or b) atomic swaps. In notary schemes, one or a number of parties carry out an action on chain, often using multisignature schemes. The advantage of notary schemes is their efficiency, while their disadvantage is that they are centralised and have not always optimally secure incentive schemes. Atomic swaps are schemes such that the token transfer happens either on both chains or on none. Setting up operations on both sides that are triggered by the same secret, where only revealing it on one chain allows it to happen on one side and by this other party. The advantage of atomic swaps is that there is no cost and there is no need to trust the other party. However, atomic swaps are unfair because one party has an advantage of delaying the swap until the price is suitable and they are not user friendly for some reasons, one being that they are interactive and if one party fails to carry out their part of the protocol in a given time they might lose their tokens without receiving anything.

An alternative approach for interoperability are **asset migration protocols** such as 1-way and 2-way pegs where the tokens are burnt (1-way peg) or locked (2-way peg) on one chain and an amount of value in tokens is issued on another chain. Two-way pegs are often referred to as wrapped tokens. These solutions can be combined with “relays”, which are side chains that follow the finality of a chain. One example of a relay is the BTC Relay project (<http://btcrelay.org>), which is an Ethereum smart contract that follows the progress of Bitcoin by storing Bitcoin block headers. Relays can be 1-way or 2-way depending on whether they follow only one side or both sides. The advantage of 2-way peg solutions is that they are more usable, however, price fluctuation between tokens pose a serious risk. In the fiat world, insurance helps with disastrous price fluctuations in the context of exchanges.

For more details see<sup>38</sup> for a systemization of knowledge on communication across distributed ledgers.

### Bridges: Current progress and what we can expect for 2021

Bridge protocols combine a number of technologies such as 2-way pegs, relays, and efficient chain validation to realize token transfer between two chains. Two prominent bridge solutions are XClaim<sup>39</sup> and tBTC that were both designed for bridging Ethereum to Bitcoin.

XClaim is a protocol designed to create wrapped Bitcoin tokens on Ethereum. Another Ethereum/Bitcoin bridge is the tBTC project, which is a Bitcoin-backed ERC20 token that is built by Summa.

Currently, the Polkadot and Cosmos projects are also focusing on bridging to Ethereum and Bitcoin. Some of the in-development bridge projects are the Polkadot/BTC bridge built by Interlay, which is a wrapped token bridge between BTC and Polkadot using 2-way pegs, relays, and a voting mechanism if attacks<sup>40/41</sup> occur on the Bitcoin side.

Another project is an Ethereum/Polkadot bridge project built by Snowfork that uses a 2-way peg, but instead of having only a 1-way relay like Interlay, Snowfork’s solution realizes a 2-way relay where each side can follow the progress of the other chain.

Moreover, a unidirectional Cosmos/Ethereum bridge that is a 2-way peg and a 1-way relay is in implementation<sup>42</sup> by Swishlabs which allows Ethereum ERC20 assets to be wrapped for Cosmos zones.

In 2021 these projects will all launch. Bitcoin bridges will allow Bitcoin to be used as a store of value on other chains, and bridging to Ethereum would allow us to take advantage of the interesting network of projects while avoiding the expensive gas costs.

One of the main challenges for cross chain communication is choosing the best trust model at each phase of the protocol, which needs to be composed based on the use case and trust assumptions of the bridged chains.<sup>2</sup> Moreover, there are also open problems that will need to be solved or solutions that need to be improved on in 2021 to make such bridge solutions secure. Many of the bridge technologies use price oracles and rely on accurate information from these price oracles. Another challenge will be dealing with price fluctuations, while some solutions for dealing with price fluctuations have been suggested in the literature, in many cases the bridge projects are unable to deal with big changes and would be insecure in such events. Another important challenge would be attacks such as 51% attacks, double spend attacks on the chains, and incentive schemes that

ensure bridge operators are incentivized to follow the bridge protocols.

### **Questions and Opportunities on Interoperability Progress in 2021**

Economics is an important part of the security in many blockchain technologies, in particular ones relying on correct incentive schemes that reward correct execution of the protocol and punish malpractice. While there has been some interesting work done on investigating crypto economics in the past<sup>43/44/45/46/47</sup> there hasn't been enough in-depth work published given the importance of understanding the economics of blockchains. This is in part because the technical complexity of many blockchain projects are not trivial to translate to concepts well known to the economic world. It is not clear whether generally accepted economics rules hold for the small blockchain ecosystems. However, with the increase in technical education, hopefully we all can look forward to more work being done in this field in 2021. What is even more interesting is analysing crypto-economics when blockchains are bridged together. How would these - until now isolated - economies impact each other?

Something further to look forward to are smart contracts that provide insurance. It is still a huge gap in the blockchain space. In the financial world, many of the security risks of transactions and collaborations are covered by insurance providing security for personal and business losses. Such insurance facilitates collaboration by allowing more efficiency due to reduced risk. After the DeFi boom in 2020 and other unforeseen events occurring in 2020 that impacted the world's economy significantly. Next year seems to be a good time to come together by strengthening collaborations and to build solutions that provide more stability and security for the blockchain world and especially for interoperability solutions.

Another interesting area to look forward to is development of interoperability between the decentralised and the centralised worlds. Currently, one of the means of connecting these two are stablecoins. Blockchain tokens have high fluctuations, partly due to their small market cap. Stable coins were designed to counter this volatility. Reducing the volatility can be either algorithmic where the market cap is increased or reduced depending on the token rise or fall in value, or the reduction in volatility can be achieved by tying the stablecoin token to a valued item that has less volatility. In the latter case, the tokens are backed by items such as fiat currency, gold, or even land. Examples of

prominent stablecoins backed by the US Dollar are Tether and Libra.

One of the interesting questions for 2021 is whether these stablecoins will be integrated into blockchain projects such as Polkadot, Cosmos, and Eth2? This would loosely connect the decentralized world to the centralised world.

Furthermore, many countries are investigating Central Bank Digital Currencies (CBDCs) which are digital forms of fiat currencies. These currencies would be centrally controlled and hence do not need to be implemented or realized using blockchain technologies. China for example is investigating using CBDCs and has started its testing phase in four major cities<sup>48</sup>. In the European Union the Digital Euro<sup>49</sup> is also being tested. It remains to be seen in 2021 whether CBDCs will be implemented using blockchain technologies and whether they will be interoperable with decentralized systems. If CBDCs end up being realized by distributed ledger or blockchain technologies, they will be using centralized or permissioned means for controlling the state of the blockchain such as proof-of-authority solutions. Aside from the regulatory challenges, some of the technical challenges for public and permissionless blockchains to bridge to such chains could be not having smart contract capabilities such as Bitcoin. Other financial instruments that could become interoperable with decentralized tokens are SWIFT and SEPA.

If the answer to some of these questions is indeed positive, that could be a huge game changer for the decentralised world in terms of widespread adoption.

In the last couple of years a lot of exciting work has been proposed and developed on interoperability. 2021 will be the year when all of these efforts will come to fruition and hopefully even more will be achieved to create a diverse and strong decentralized web that we are looking forward to.

## Interview

# Decentralized Finance and the Maker Protocol

Interviewed by Raffael Huber

**Raffael Huber:** *Let's talk about the basics first - what is it that makes DeFi so powerful?*

**Rune Christensen:** What really drove the recent explosion in popularity was the composability of DeFi. Composing protocols together stopped being a curiosity, and instead became a really powerful way to create new products. The best example is yearn.finance, which illustrates how to powerful products that rely entirely on other protocols can be built.

**RH:** *So you were excited about the onboarding of YFI to Maker?*

**RC:** What was exciting is the fact that one decentralized community came to another decentralized community and made a governance proposal - that enables a new type of interconnection. But most of yearn's most popular products are built in completely permissionless fashion on Curve, Compound and Aave and so on, which is cool. There are more examples of this, such as InstaDApp - which was actually built by two Indian teenagers with no money and no connections! - that combined the Maker Protocol and Compound, or DeFiSaver that's also built on

top of Maker mainly. It showcases the potential of DeFi, blockchain, and permissionless innovation: You can create these core, low-level protocols that do some particular activity, and then several layers are built on top. Yearn is building on top of Curve which is building on top of DAI. That complexity is only going to increase over time.

**RH:** *What else do you see emerge in the future? What other kinds of protocols will be built on top of the Maker protocol?*

**RC:** Right now, there's a mini-boom in apps that create two-sided markets between fixed and variable interest rates, so people can hedge their rates. This has been debated in the Maker community for years, but the conclusion always was that we'd wait until somebody else builds it. This is happening now, and others can build a service without any need to coordinate with the Maker community - but it will still significantly increase the value of the Maker protocol. I've formulated this basic thesis years ago in a semi-famous reddit comment which was actually more well-known than the Maker project. I explained that Ethereum was much further ahead than all other blockchains already at

this early stage because it all comes down to the synergies, Metcalfe's law: The number of connections and the value of the network scales exponentially with the number of nodes. So every time a new, interesting application is added to Ethereum, you're not just expanding the value of Ethereum directly through the application, but also that of every other decentralized application (dApp) by a little bit because they can now access the synergy with this application. Through these powerful synergies, you get a flywheel effect - the more value you have, the more value you attract. That's also why DeFi cannot move off Ethereum, and also underlies the big debate on scalability. It's hard to coordinate actually moving elsewhere, everyone just wants to stay where the value is.

**RH:** *Lots of protocols are now governed by governance tokens similar to Maker. We've seen some first, maybe not openly hostile, but surely profit-seeking attempts to influence governance, for example between Curve and Compound - how can this aspect of hostile takeovers of governance be controlled?*

**RC:** That's absolutely a reality already and a very real risk in the wild west of permissionless, pseudonymous blockchains. The Maker community emerged from an earlier community called BitShares, which had already been dealing with such long-term issues for years. Maker solves the issue of governance takeovers through the emergency shutdown, which represents a minority stakeholder protection. That is like a "mutually assured destruction" game theoretic approach to dealing with corrupt governance. Opposed to other DeFi protocols, Maker is focused on extreme scale, it is meant to be a neutral, unbiased world currency - so systemically important that it has to immediately and fully cover all issues, even of the long-tail kind. If you have any theoretical vulnerability, you can't responsibly scale such a system. That's why we deal with such issues upfront - the game theory of emergency shutdowns or strongly protected and resilient oracles with the tradeoff of being less efficient.



**RH:** *So you don't think Maker would switch to Chainlink-based oracles?*

**RC:** It could incorporate them to benefit its own infrastructure in various ways. But oracles typically focus on efficiency and speed, on providing super-precise data as quickly as possible. In the Maker community, it's more about being 100% sure that no oracle attacks are possible. A system designed for systemic distribution and importance in the global economy cannot have any unsolved theoretical issues. Maker has a bunch of solutions, which come with costly tradeoffs. But there have been lots of examples of what happens when you don't take it seriously enough, such as EOS being completely taken over by a cartel of miners. Another crazy story was Binance

doing a hostile takeover of Steem, and also recently the whole SushiSwap drama with a behind-the-scenes takeover. This shows that it's easy to quickly bootstrap and go for full decentralization and power to the community, but these systems might end up in a suboptimal equilibrium. Sometimes decentralization actually works against decentralization, in a sense. Maker has always followed a careful approach of gradually handing over control to the community, so that the community is strong enough to handle unexpected situations or conflicts with some newly available aspect of governance.

***RH: Very interesting. Speaking of reaching this global scale, surely you have also talked about scalability and layer 2 (L2) solutions. Do you think it is possible that Maker would move part of its system to second layer solutions? Creating a Maker Vault is quite costly, at the moment.***

***RC:*** In Maker, we are a lot more focused on economic scalability rather than blockchain scalability. What's great is that because of composability, DAI is already available on every single production L2, like Loopring or xDAI or zk-rollups. As an ERC-20, it's incredibly easy to access DAI. However, you're right that Vaults should be more accessible to smaller users - that's important, but not so much a priority. The logic is that it's more important that DAI is very solid and scalable, and that it's okay if the vaults are more focused on large holders and advanced users. If DAI is ubiquitous and really works well, L2 lending platforms will take over that role. Compound and Aave will have some scalable solution on Optimism maybe very early. I think that Optimism has the highest probability, people might converge to it in the short run, and it might be the first time where we see a mass migration. DAI will just be available there from day 1. At some point, it's also important that Maker can run and generate DAI on more than one blockchain at the same time - other blockchains and scalability networks, maybe even private, corporate, federated centralized chains. But that's not a priority either - because the real prob-

lem that Maker is facing right now is simply scaling the supply of DAI. DAI is worth more than \$1, even though there's \$900M in circulation, there's demand for even more. It's not so easy to have that extra DAI generated because there isn't enough quality collateral available on Ethereum. When people in the Maker community think about scalability and growth in the long run, it's about real world assets - opening up the floodgates for the traditional financial system and tokenized versions of real world business activity to interoperate with DeFi and Maker. DAI could be based not just on BTC and ETH, but also for example gold, stocks, bonds, other commodities, real estate - real estate drives most of the real world banking sector and is sort of what underpins money in general. We've been thinking of this for years, and this month of October, for the first time, there's a concrete Maker governance proposal that would onboard the first real world assets onto Maker to power DAI generation. Governance is considering to extend a loan of \$15M for the construction of an auto parts shop in the U.S. - the holy grail of real world assets condensed into the mundane "we want to build an auto parts shop". But once it proves to be possible, there's nothing preventing it from scaling up massively.

***RH: Speaking of real world assets: How will the oracle problem be solved?***

***RC:*** It's not really a problem because you just rely on traditional methodology. In the previous example, the approach to oracles - which really means when do you proceed with liquidation and not use the assets as collateral anymore - is that the community will do it manually through a governance decision. Unlike the wildly volatile ETH where you need to react in real time, something like real estate is not going to lose 50% of its value overnight, given proper risk assessment: If someone defrauded you and no assets are there, you're already stuck with worthless assets. What has been holding up real world assets for years is the basic question of legal recourse - how do you legally enforce a claim by a decentralized organization (DAO)?

There are now some credible proposals how to replicate the traditional legal structure and get the legal recourse similar to how a bank extending a loan for real estate does it. A DAO would instruct some real world proxy to enforce the claim, because the DAO itself doesn't have a legal personality. It turns out you can set this up with the trust structure in the U.S., and there are similar models around the world that can be used.

***RH: So that would also help with the economic scalability of DAI and it would get back to \$1. Now the idea is to go to another peg at some point, to another fiat currency or even something like the Consumer Price Index - where do you see that part of Maker going?***

***RC:*** That has always been the vision. In the short run, it's enough trouble scaling a simple USD peg and get DAI back to \$1 while having a nice DAI savings rate. It's really the ability of Maker to provide a low risk savings rate that creates a new paradigm for business models built on top of the DAI stablecoin and DeFi. For example, we were involved in a dozen or so initiatives in Africa, all using DAI as a store of value for financial inclusion projects where the whole point was to provide banking services and basic savings accounts to rural, disenfranchised people completely cut off from the financial system, maybe even the Internet - and give them access to assets that are protected from inflation and even get a decent return with low financial and counterparty risk. The startup that provides the service can even monetize because they can also take a little cut of the DAI savings rate. This is possible because the Maker protocol is so efficient, itself it needs to take only a very small cut of what is paid out in DSR and what is earned in stability rates. It has been very frustrating that all of this was crushed because demand for DAI was just too much and Maker was not able to scale the supply in time. Once that gets back to equilibrium, DAI can realize its full potential and you might see the balance flip to the other side - when the ball really starts rolling on e.g. funding real estate projects through Maker, there may

not be enough people that want to hold DAI versus how many people want to finance new real estate projects etc. And when that happens, it will finally be the time to return to the original plan of expanding the DAI stablecoin.

If you need to grow supply, you onboard more collateral - if you need to grow demand, you onboard more synthetic assets, like a Euro, Yen, Pound and so on version of DAI, pretty much anything. Once we reach that point, you'll really see the crazy scale of the system - that's what it's really meant to do, facilitate this incredible financial scale in an open, transparent system without opaque fee structures. This will ultimately benefit the end user. In the very long run, circular economies entirely based on DAI might emerge, where the Maker governance and monetary policy of Maker is trying to stabilize those economies rather than achieving a peg. That's also when you could consider creating a version of DAI that is free-floating, a currency that focuses on its own economy basically. But these are just some long term ideas so far in the future that it's impossible to imagine what Maker governance would look like then.

***RH: So you would much rather see DAI going back to its current peg through an increase in supply rather than something like negative interest rates, something that changes the whole dynamic of how vaults operate? There is a proposal that would effectively allow negative interest rates...***

***RC:*** There is a community-created mechanism that would allow to break the peg and decrease the target price of DAI over time. In my opinion, it's really obvious for anyone that actually understands what Maker's user base looks like that this would be total suicide - it would pretty much kill the project. The reason why DAI is successful is that it is actually serving a real user base of real people that use it as money, e.g. in South America or Argentina, not crypto nerds or super tech savvy people, but just regular people that use it with their smart phones to escape inflation in their own currency. They trust DAI because they can create that mental image where DAI on the phone is like cash in the pocket. Nobody

can inflate it, it's reliable, hard money that even if not precisely at peg is incredibly stable. Money is so much about trust and brand - what money you use is a psychological decision based on things like fear of inflation and trust and so on. If you break the 1 DAI = \$1 idea, you're betraying your user base. DAI at \$0.99 isn't so bad in principle, but the promise, the guarantee that I thought I have - turns out I didn't have that. The people proposing this mechanism have a different relationship with the currency, coming from crazy DeFi whale-farming, but that's not where the longer term future of Maker lies. It's supposed to get out of the crypto bubble and serve the real world. So it would be a fatal mistake to remove that possibility up front by destroying the trust in DAI. Even though it's above the peg, that's currently good enough and backing it with centralized stablecoins works until real world asset scalability allows for more organic growth. Maker will have really succeeded once it's seen as a boring project - at the moment, DAI can be boring because it's trusted. It's important to keep it that way.

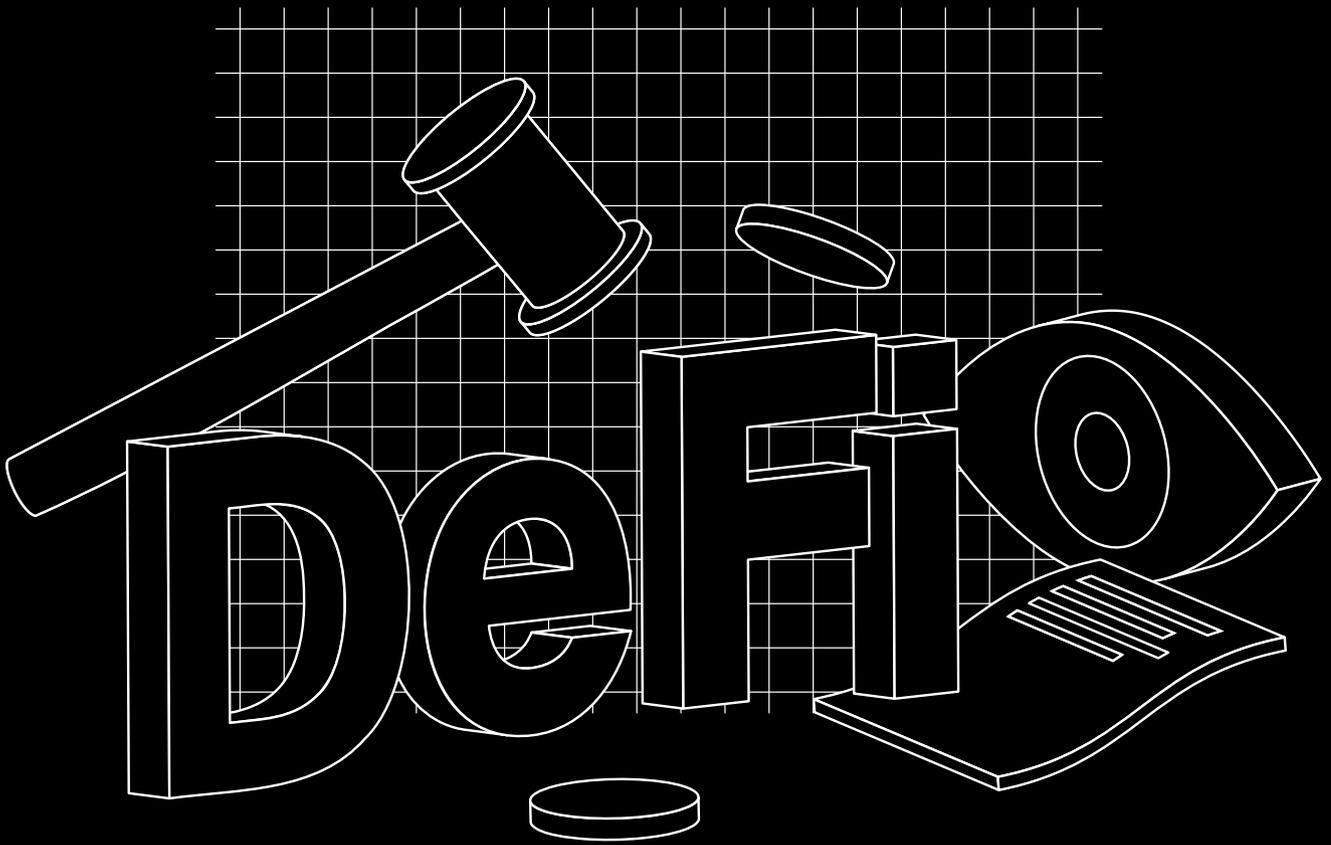
***RH: Going back to the topic of composability - how do you think Ethereum 2 (ETH2) will interact this? There are some different approaches to ETH2 now like "Phase 1.5 and done". Will there be DeFi specific shards?***

***RC:*** Composability as we see now happening on the current Ethereum chain will not be possible to do at an ultra-large scale in the long run. There will need to be some bolt-on solutions that help maintain it across a sharded ecosystem. But even before ETH2, we'll be dealing with this issue when DeFi tries rollups at scale. So I completely agree with Vitalik's rollup-centric view of ETH2 - either rollups are going to work, or they're not going to work - and if they don't work, it's like a dead end for the entire space. Maybe then, DeFi would be able to migrate to another blockchain with better native scalability, but you still have to solve the physical limitations that underlie the fundamental characteristics of the technology.

***RH: One thing that I'm wondering is: Can you somehow do undercollateralized loans through DeFi or through Maker? Is there a way, perhaps with an identity system or so?***

***RC:*** The real problem or misconception are the terms "secured" and "unsecured" lending from traditional finance. The concept of an undercollateralized loan is non-sensical. It cannot happen - because it's equivalent to saying you would lend \$1M to someone who you know can only possibly have recourse for \$500k - a transaction with an expected loss of \$500k for you. So you always have overcollateralization, not matter what. The question is what form this collateralization takes. For secured lending, some physical asset is deposited, like putting up ETH as collateral in Maker. For unsecured lending or microlending, the legal claim against that person becomes the collateral. The question then becomes how to properly tokenize and maybe bundle or manage legal claims against individuals to use them as collateral in some DeFi protocol. In Maker, as a first way to implement this, perhaps a consumer credit company would tokenize their portfolio of consumer loans into an asset-backed security. The bundled legal claims of, let's say 10'000 people, are represented as tokens, which could then be used as collateral in the Maker protocol. The first step is to solve the fundamental problem of how to onboard real-world assets, how to enforce legal recourse against those assets using some sort of proxy in the real world. It needs to be a reliable mechanism, which would then allow you to also do proper risk management.

***RH: Thank you very much, Rune, this has been very insightful!***



# The Rise of DeFi: Regulatory Thoughts

Authors: Lars Hodel & Thiemo Pirani

Mid 2020 the craze surrounding Decentralized Finance (DeFi) was one of the latest hypes in the adoption of decentralized business models. Just as the ICO boom in 2017 paved the way for more mature business models including STOs and tokenization in general, also DeFi is here to stay and grow further. The DeFi sector is growing fast both internationally as well as in Switzerland.

To accommodate these changes in the business world, the legal and regulatory framework has to adapt to the new ways. In this spirit, the Swiss parliament has just voted unanimously for a new DLT-law and a DLT-ordinance is in progress. The new Swiss regulatory framework is based on a technology-neutral approach and provides much needed legal certainty. In its substance and overall direction, the new regulatory framework for DLT is broadly supported and welcomed by the concerned industry.

Nonetheless, financial market supervision and regulation is never finalized as the world is changing constantly. The regulatory coverage of DeFi is one of those topics that necessarily will evolve with the ever-changing DeFi space. It is therefore useful to think about the principles and the history of financial supervision. Especially in the light of the proposed changes in the Swiss AML Ordinance, a closer look at this specific aspect of financial regulations seems to be warranted.

■ DeFi should be seen as part of the “external wallet” world and not the “intermediary world”

■ Intermediaries should take appropriate measures to integrate the use of DeFi into their AML risk framework

■ AML effectiveness and efficiency will not be improved if DeFi is regulated on the same grounds as intermediaries, but only if point 2 is done properly

## Historic Perspective

Historically, the target of anti-money-laundering regulation has been dominated by the US. In consequence, the reasons for the continuously tightened AML-regulations were mainly the war on drugs and on organized crime.

Switzerland has, under the impression of international and US efforts, followed these aspirations and introduced ever more stringent requirements for financial intermediaries. Also, international bodies such as the FATF or the OECD have substantially developed and evolved the international cooperation, but also did not hesitate to publicly blame individual countries if standards were not implemented or followed as intended.

It may not be immediately obvious why, in order to target organized crime and drug lords, more supervision and checks on financial intermediaries should apply. The idea was and is to isolate financially those who are in possession of tainted money and make it ideally impossible for the tainted money to be used and reintroduced into the realm of lawful business. Therefore, the guarantor status of financial intermediaries has been shaped in a more and more exhaustive way over the last years (e.g. including tax offenses or reduction of thresholds), providing an additional attack vector for the state next to the general penal law provision of the Swiss Penal Code.

## Expansion of Financial Regulation

It is a characteristic of regulatory activity that it thrives after crises, since those reveal the weak points of the existing and highlight the need for the new. The financial crisis of 2008 has been no different: an endless flurry of new reporting obligations, forms and duties of care have since emerged.

The overall aims of the increased supervision of the financial world are contained in the Financial Market Supervision Act.

The key objectives of the Swiss financial supervision are protection of creditors, investors and insured persons (some would include consumer protection as well) as well as ensuring the proper functioning of the financial market, both contributing to a sustained reputation, competitiveness and sustainability of the Swiss financial centers.

It is therefore only understandable, that also the DLT industry is subject to this cycle. One can assume that without the ICO boom in 2017 the whole regulatory activity surrounding the classification of tokens would not have been developed in the same way. While this was a strong signal from the regulator (for some it may still have been a surprise), it also provided much needed clarity for the industry. Today, these classification rules are implemented in the operational processes and are further shaped by practitioners. It is understandable, that the same will happen regarding the further adoption of DLT, especially in the DeFi space.

## Specific Aspects of DeFi

### Technical Complexity

Supervision of decentralized digital assets is inherently difficult, as there is no central institution with deciding influence. Another difficulty arises from the technical sophistication of these financial products, e.g. the blockchain versus a traditional bank's books, smart contracts versus normal contracts, and so on.

In the explanatory report to the DLT blanket ordinance it is mentioned that supervisory authorities are facing difficult and disproportional assessments to evaluate which legal rules apply in the outlined context. In this spirit, the proposal of the current blanket ordinance is to dramatically broaden up the definition of activities and parties which are covered under the Swiss AML framework, rather than a fact-based assessment on an individual level.

## Intermediary Activity

In Switzerland, the AML framework applies to financial intermediaries which are defined in the Swiss AML Act. It is an undisputed strength of the Swiss framework that this definition is rather broad, which – for example – made it possible that back in 2014 Bitcoin Suisse could be regulated as financial intermediary.

The challenge in the world of DeFi is that multiple actors work together not through a central intermediary, but based on smart contracts and individual interactions with their addresses on the blockchain. While in most cases someone is actively maintaining a DeFi protocol, there are also endless options to just deploy a certain functionality to the blockchain without anyone maintaining it any further.

The current regulatory direction of impact is therefore to broaden up the legal requirement of “power of disposal”, which lies in the core of the Swiss AML framework. It is planned to broaden up the supervisory activity and regulation to actors who are capable in supporting the transfer of virtual assets but cannot do this independently (e.g. in multi sig environments). Connected with an additional requirement of ongoing business relationship, the framework tries to avoid dealing with the technical reality and complexity of each case by broadening up the range of targets under AML supervision.

Be it a makeshift solution or actually intended, it seems at least questionable if certain roles in DeFi are equivalent to those of traditionally supervised and regulated financial intermediaries. Whether they ought nonetheless to be treated equally should be judged with both the role of such platforms within DeFi as well as the objectives of the supervision and regulation in mind.

### Goal of Regulation

The regulations’ objective (protection of creditors, investors and insured persons, ensuring the proper functioning of the financial market and thus contributing to a sustained rep-

utation, competitiveness and sustainability of the Swiss financial centres) does not necessarily require DeFi business models to be subject of the regulation, as these platforms only connect those already willing to trade, without itself holding any positions or advisory mandates.

It is exactly those activities that in traditional finance justify the subjection of financial intermediaries like banks and fiduciaries to regulation and supervision. As these functions are not fulfilled by specialized entities within DeFi, but rather are also decentralized to all the participants, regulatory activity has to find another subject, in order to ensure achieving the objects of regulation.

## Approach for a Solution

### Power of Disposal as Proven Criterion

One tried and trusted criterion to determine who is to be subject of supervision and regulation is the authority to dispose over assets belonging to others. Keeping in mind the ultimate objective of AML regulation, to financially isolate those in possession of tainted money, this cannot be achieved if there is no one which has this power of disposal in DeFi business models. Also, without power of disposal, the potential subject of AML supervision could not ensure some of his duties, such as a blocking of assets, which would lead to difficult legal questions and less legal certainty for everyone.

### Use of DeFi as Part of a Risk Framework

Currently, fiat currencies are only able to interact with DeFi models if stablecoins on blockchain protocols are available. It becomes evident, especially under the latest regulations connected to the travel rule and proof of ownership, that there will be two different worlds: The world of custodial wallets, and the world of external, individual wallets. To interact with DeFi protocols, a person needs to choose either his individual wallet, or use custodial wallet of his provider. As soon as this person interacts with a finan-

cial intermediary (e.g. to convert digital assets into fiat, or to participate in an ICO, to exchange currencies which are not supported in DeFi), the history and economic background are to be clarified and documented while opening the relationship. It should be in the competence of each financial intermediary to assess and define to which extent the use of DeFi is impacting the risk assessment of a client. It can be imagined that financial intermediaries are applying enhanced due diligence for transactions or clients linked to DeFi. In any case, it requires a deep technical understanding, even if it is sometimes a lot to ask to fully understand a business model.

In case a person is using DeFi with his custodial wallet, the provider is subject to AML supervision and by law needs to ensure that he is aware of the transactions and risk connected to this service.

In both cases the AML risk connected to DeFi could be mitigated and detected without broadening up the supervisory focus to DeFi business models without a true intermediary. This would allow the supervision to rely on the technical expertise of existing financial intermediaries, who need to understand and assess such activities, and would be in line with the historic approach of using the intermediaries instead of trying to isolate tainted funds on an individual level.

### **Independent Use of DeFi**

One side effect of regulation is that clients and investors can place trust in the system, in the supervised entities and thus need calculate with less mistrust in their investing decisions.

If DeFi were, as proposed here, regulated in accordance with the principle of authority to dispose, clients and investors could not trust on their counterparties being checked for trustworthiness for them and would need calculate with a certain risk.

However, in all other areas of business clients and investors are responsible for the choice of counterparties as well and cannot depend on the state vetting their counterparties for them. It appears therefore to be an acceptable trade-off.

### **Use of DeFi with Trusted Financial Intermediaries**

However, clients and investors do not need to be entirely unprotected. Experience in traditional finance shows that one can satisfy the clients' and investors' justified need for protection in different ways, one of which is to regulate professional service providers. This approach, in contrast to purely regulating the financial products, regulates those with both great influence over the system and great opportunities to digress from the legal and moral path.

As professional service providers can also be expected to be more acquainted with the regulatory requirements, the regulation will also yield better results as they will be followed with more know-how. In addition, the objectives of regulation and in particular the protection of clients and investors can be ensured more effectively and efficiently than with regulating the DeFi products themselves.

It is also preferable from a systemic point of view. Regulating the professional service providers with their greater influence, greater power and thus creating a standard of services that can transgress into the entire system is likely more effective than regulating the minutiae of individual DeFi products.

### **Conclusion**

This article shows how intermediaries are the target of regulations and how this may conflict in first sight with the rise of DeFi business models. It is however also visible that DeFi could be effectively regulated without broadening up the scope of the Swiss AML Framework. This could be achieved by mandatorily requesting financial intermediaries to include DeFi in their own risk framework, and act as guarantors, like with all other financial activities. In the end there is also some relaxation needed – as history showed, regulation can never cover all possible outcomes. Switzerland should not jeopardize its fabulous position by trying to cover DeFi business models without providing substantial benefits for the regulatory goals.

# Neo Blockchain: What's Next?

Authors: Dr. Guilherme Sperb Machado  
Claude Müller

Neo is an open-source and decentralized platform that was released in 2014 with the initial name of “Antshares”. The rebranding to Neo happened in 2017 with the vision to enable a smart economy by using blockchain technology and smart contracts for issuing and managing digital assets. In contrast to other well-known blockchain technologies with smart contract capabilities, Neo started with a Proof-of-Stake consensus mechanism from the beginning – more precisely, the Delegated Byzantine Fault Tolerant mechanism (dBFT).

Neo’s MainNet was released in 2016 and has since received continuous enhancements to its platform. The latest being a completely new iteration of the Neo blockchain going under the name of Neo3, which brings several major improvements to the current Neo2. It is the result of a joint effort between the Neo Foundation and various open-source communities, preparing the Neo network for mass adoption.

This article looks back on the 4 years since the Neo2 MainNet launch and gives a future perspective by looking at Neo3’s recent developments.

## **Looking Back: Neo2 Impact**

Neo considerably captured the attention of the blockchain community due to multiple factors.

One of these factors is the evolution of its innovative consensus mechanism. From the start Neo applied dBFT 1.0, an adaptation of pBFT (Practical Byzantine Fault Tolerance), enabling fast single block finality. In other terms, single block finality denotes that confirmed transactions become irrevocable in the next block. No need to wait a couple of blocks to be certain. Several projects use versions of BFT nowadays, such as Libra<sup>50</sup> and Cosmos<sup>51</sup>, but back then it was an innovation in the blockchain space. However, dBFT 1.0 was susceptible to a single block fork in rare scenarios of high network latency among consensus nodes<sup>52</sup>. While this could happen without stalling consensus, many Neo full nodes could potentially accept the forked block in the network, ultimately leading to operational issues.

Therefore, the community widely discussed the problem and developed dBFT 2.0<sup>53</sup>. In this version, not only the issue was fixed, but also performance was improved for situations like consensus node restarts



due to hardware failures and targeted network attacks. Figure 1 shows the performance before and after the rollout of dBFT 2.0. Moreover, the dBFT 2.0 implementation provides audit instruments to keep track of any consensus nodes' misbehavior.

Another property of Neo that captured attention is the dual token scheme: NEO and GAS. While NEO gives the holders rights to manage and make decisions in the network (e.g., parameter changes), GAS functions as the utility token of the network (e.g., pay for transactions, smart contract deployments and invocations). 100 million NEO were minted at launch of the MainNet, while GAS is minted to NEO holders continuously in each new block to incentivize possession of NEO. The Neo network was one of the first having the notion of holding native assets to accumulate a utility token.

Neo was also a precursor in its vision on how to provide tools for smart contract development. In contrast to Ethereum, EOS, Tezos, and others, Neo supports several general-purpose programming languages. Therefore, developers are not required to learn a new programming language to write smart contracts and build Decentralized Applications (dApps) on the Neo Blockchain.

**Looking Back: The State of Neo2**

Figures 2, 3, 4, and 5 reveal general user activity on the Neo2 blockchain under different metrics. The green lines show daily values while the dark lines represent the accumulated value over time.



Figure 2. An average of 1.3k new addresses are created on the Neo2 blockchain per day.

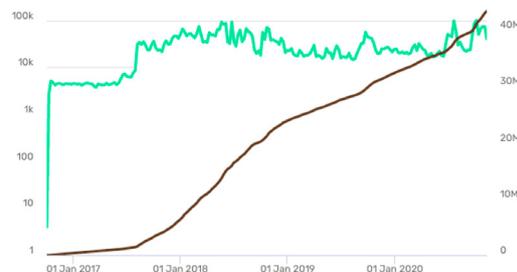
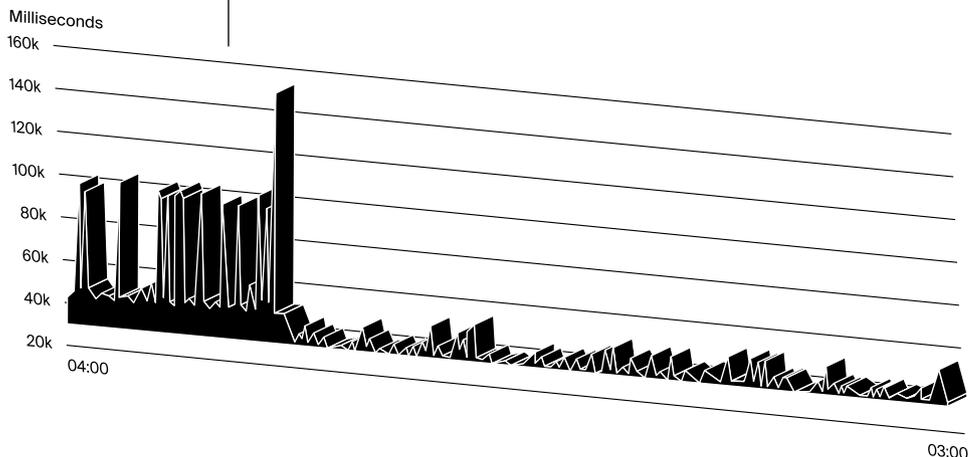
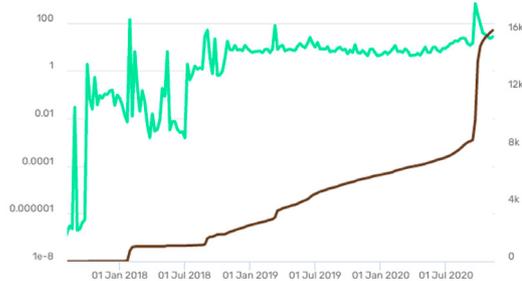


Figure 3. The number of transactions per day reached 100k+ during the DeFi craze in September/October of 2020.

Figure 1: Maximum block time on the Neo network on a per minute basis, before and after dBFT 2.0 was deployed<sup>53</sup>



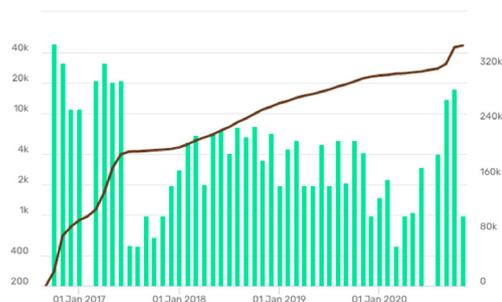


*Figure 4. Network fees represent the priority given to transactions made on the Neo blockchain. In other terms, consensus nodes will first process transactions that have higher network fees. Network fees have considerably increased during the DeFi craze in September-October of 2020.*

### Looking Forward: Neo3

While Neo2 brought innovation together with operational continuity over the years, it is widely known that several challenges remain in the blockchain space. Slow adoption, missing standards, insufficient scalability and usability are the issues that stand out.

In order to accelerate enterprise-grade blockchain innovation for the future, as well as mass adoption through great usability, Neo3 is being developed with strong support from multiple communities around the globe. Neo3 will deliver a scalable platform with higher throughput, enhanced stability and security, an optimized smart contract system, and a feature-packed infrastructure set.



*Figure 5. System fees represent the utilization of the Neo blockchain. In other terms, system fees are collected by consensus nodes for executing the transactions (e.g., due to smart contracts' functions). It is possible to observe that during September/October of 2020 similar levels of utilization was reached as during the ICO bubble in 2017.*

## Comparison Neo2 / Neo3

	Neo2	Neo3
<b>Architecture</b>	UTXO-based, similar to Bitcoin	Account-based similar to Ethereum. More intuitive, decreased complexity, and a unified way to deal with all digital assets on the Neo network.
<b>NEO and GAS</b>	NEO and GAS are handled differently from other tokens created on Neo (see UTXO model).	NEO and GAS become NEP-17 tokens <sup>65</sup> which is the token standard for Neo and can, therefore, be handled equally to other tokens on the chain.
<b>Smart Contracts</b>	A contract can reuse an invoker's signature to call other contracts. This is risky from a security perspective.	The permissions and trust of a contract can be specified more granularly. They are defined on deployment of the contract and include, for example, which other contracts may be called from within a contract. Similarly, an invoker can add permissions to her signature, restricting the scope of its use and, thereby, making invocations more secure <sup>66</sup> .
<b>Neo Virtual Machine (NeoVM)</b>	The NeoVM is part of the neo-node software.	The NeoVM is decoupled from the Neo node modules. Thus, it can be used independently and generically.
<b>Contract Deployment Costs</b>	High costs for smart contract deployment.	Deployment costs are lowered significantly fostering the development of dApps and, consequently, leading to wider adoption and a larger number of use cases.
<b>Contract Invocation Costs</b>	First 10 GAS consumed by an invocation are free to attract projects and users.	No free GAS for invocations because it introduced too much risk for network stability.
<b>Execution Fees</b>	Each NeoVM instruction has a fixed GAS price.	NeoVM instructions are associated with a relative cost. The accumulated cost of a contract invocation is then multiplied with a fee factor that is adjustable by the network. Thereby, the network can react to high GAS prices, lower the fee factor and keep invocations at a reasonable price.
<b>Performance</b>	The network fee can be paid to get priority on transactions	Compression on the peer-to-peer messages, thus less bandwidth usage and ultimately higher Transactions Per Second (TPS) or less risk of a TPS reduction in high workload scenarios. Table 2 shows the gains in terms of message size.
<b>Oracles</b>	Contracts relies on external services for oracles.	Oracles are built-in to Neo3 such that designated oracle nodes validate external data. The mechanism works similar to the request-response message pattern <sup>67</sup> .
<b>NeoFS</b>	No integrated distributed storage capabilities.	NeoFS provides distributed and decentralized storage and is integrated with Neo3 <sup>68</sup> . It is built by Neo SPCC <sup>69</sup> . NeoFS gives the user full control over her data by allowing her to specify storage policies, which define, for example, in which geographic regions data can reside.
<b>Governance Model<sup>71</sup></b>	NEO holders directly vote for the 7 consensus nodes, network policies, fees, and GAS circulation. This all happens on-chain and can therefore lead to a lot of voting traffic. Additionally, it is questionable if the average user has the expertise to decide on such network parameters.	NEO holders vote for a committee of 21 governing members. These committee members are responsible for representing the community by voting on network policies and other parameters. Out of the 21 members, the 7 with the most votes also become the consensus nodes. The consensus nodes have the veto power on decisions made by the committee if two-thirds of the consensus nodes agree on the veto.
<b>Economic Model<sup>71</sup></b>	NEO holders receive GAS generated in a block proportionally to their holdings.	10% of the GAS generated by each new block is distributed to all NEO holders proportionally to their holdings <sup>70</sup> . 85% goes to those NEO holders that successfully voted for one of the 21 elected committee members. This incentivizes governance participation and convergence of votes to certain members. The remaining 5% are distributed to the committee members as an incentive to maintain a healthy network and governance. See Figure 6.

Table 1 shows a non-exhaustive list of adaptations that differentiates and improves Neo3 over Neo2.

Case	Block Size (uncompressed)	P2P Message Size	Compression Ratio	Size Reduction
Block #1945085 (largest)	3,002,776 bytes	230,947 bytes (compressed)	13.002	92.31%
Block #1318368 (medium)	512,428 bytes	503,367 bytes (compressed)	1.018	1.77%
Block #4 (small)	686 bytes	691 bytes (uncompressed)	1	0%

Table 2: Examples demonstrating compression ratio and size reduction using past blocks (Neo2) and the new auto compression mechanism in Neo3.

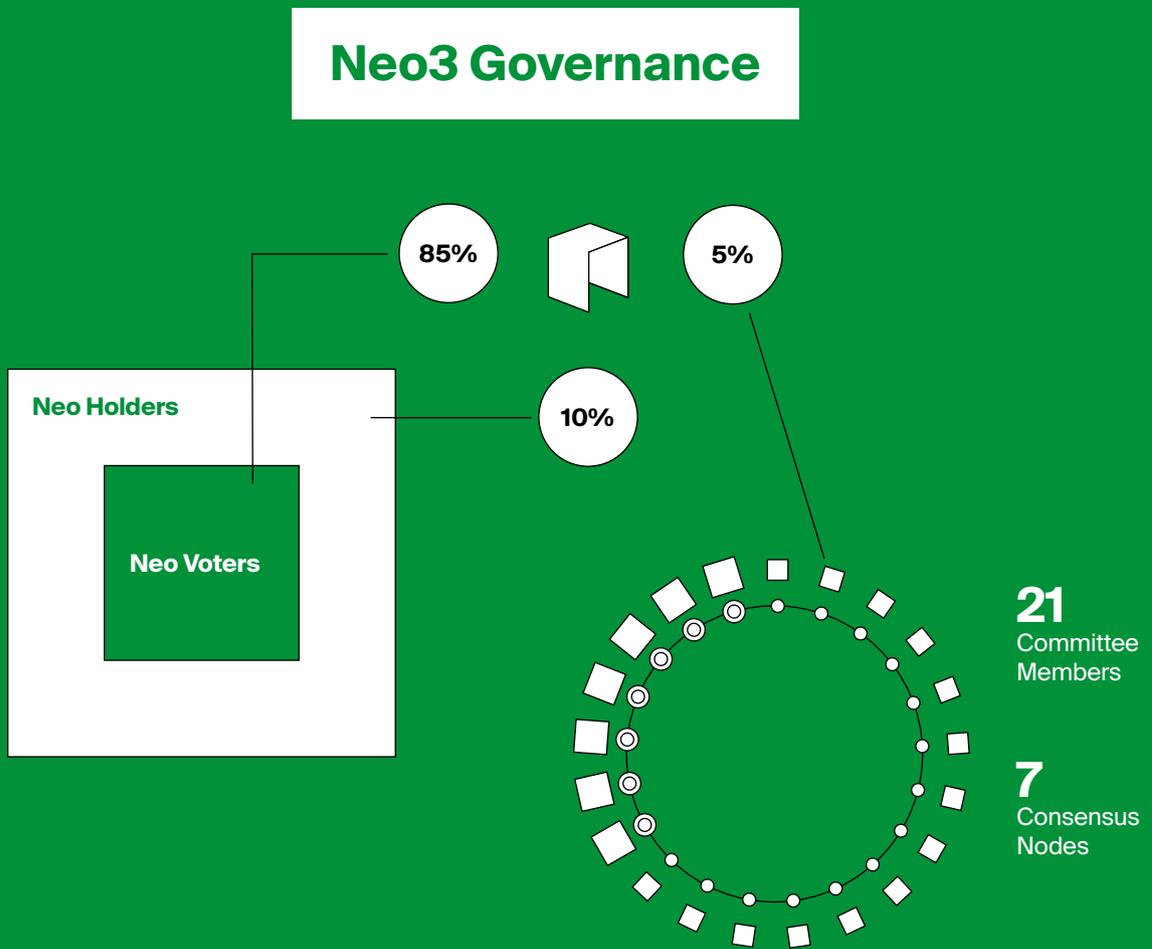


Figure 6: Neo3 governance model illustration<sup>71</sup>

A noteworthy inconvenience in Neo2 is related to developer experience (DevEx). A general and recurring feedback was the need of better tools when building dApps and Smart Contracts. Therefore, it is important to highlight the comprehensive efforts from the different Neo communities to provide developer tools (i.e., SDKs, compilers, IDE extensions) for the upcoming Neo3 platform. The goal is to deliver superior tooling compared to what is already available for Neo2. Members of projects like the Neo Blockchain Toolkit<sup>54</sup>, neow3j<sup>55</sup>, mamba<sup>56</sup>, the Neo Playground<sup>57</sup>, among others, are working in parallel to the Neo core team to deliver the toolset right on time for the Neo3 MainNet release.

### Recent Strategic Developments

Over the years, Neo has attracted and consolidated strong support from multiple communities around the globe. Next to the Neo Foundation and the core developer team, Neo Global Development (NGD) interacts and manages developer communities like AxLabs<sup>58</sup>, City of Zion<sup>59</sup>, NeoResearch<sup>60</sup>, and NeoSPCC<sup>69</sup> to name a few. These communities enrich the Neo ecosystem with a multitude of software tools and thereby enable developers and businesses with different backgrounds to build their applications on the Neo blockchain. For attracting even more developers, NGD has recently set up a streamlined grants system that lowers the entrance barrier for new developers interested in contributing to Neo's prosperity.

Neo is active not only inside of its own ecosystem but pushes adoption of blockchain technologies in cooperation with other industry partners too. In 2020, NGD became a founding member of the InterWork Alliance alongside other companies like Microsoft, Nasdaq, and the SIX Digital Exchange<sup>61</sup>. The alliance has the goal of accelerating blockchain adoption in businesses by producing standards and frameworks.

Moving towards interoperability and DeFi, Neo launched a protocol alliance called Poly Network<sup>62</sup> as a founding member. The goal is to enable cross-chain asset transfers and transactions. Based on the Poly

Network, Neo's first DeFi protocol called Flamingo Finance was released<sup>63</sup>. In the end of 2020, the peak of total value locked in the so-called "mint rush" reached around 1.6 billion USD, of which around 500 million USD were cross-chain assets, e.g., Bitcoin and Ether<sup>64</sup>. In addition, other modules are being developed within the Flamingo platform to solidify its presence in the DeFi space: Perpetual Contract Trading (Perp) and Community Governance (DAO).

### Neo3: TestNet and MainNet plans

The rollout plan for the TestNet and MainNet are not yet fixed and can shift according to decisions by the community.

- The Neo3 TestNet launch is expected for Q1 2021.
- Neo Foundation will organize a hackathon in early 2021 to promote Neo3 development.
- Neo3 MainNet rollout is planned at the end of Q2.
- Neo2 and Neo3 chains will co-exist for a period. Documentation and cross-chain tools to convert tokens and migrate Smart Contracts will be provided.
- After a grace period, Neo2 chain will be superseded by Neo3.

## Conclusion

After four years of Neo2 MainNet, Neo3 is the largest and most impactful update in the Neo ecosystem's history. Other blockchains with smart contract capabilities employed Proof-of-Work (PoW) for consensus when they were released but are slowly switching to Proof-of-Stake (PoS) mechanisms, like, for example, Ethereum. Neo was established as a PoS chain from the beginning, accumulating years of experience with BFT-based consensus algorithms. Neo3 will certainly refine what was already good in Neo2 (i.e., dBFT), but, most importantly, focus on advanced features and improvements to bring blockchain to mass adoption.

In a nutshell, Neo3 will be more attractive for a wider audience because of lower smart contract deployment costs, better accessibility for developers, an integrated Oracle and distributed storage system, as well as better performance and security. This allows Neo to accommodate a substantially larger amount of use cases and could potentially increase the number of deployed contracts by 10 to 100 times. With such growth one can anticipate a snowball effect, where ultimately Neo could power the next era of enterprise-grade blockchain applications.



# From Bitcoin Pizza to Shaping the Future of Digital Assets

An interview with Bitcoin Suisse Director and Series A lead investor Roger Studer

Interviewed by Ian Simpson

**1. What is it about cryptocurrencies, digital assets and blockchain that appeals to an entrepreneur and former investment banker like yourself?**

It is freedom, purpose, global collaboration and a growth market with enormous opportunities. On the other hand, the traditional, the traditional financial industry is growing at a slow pace and is under massive pressure from tech companies. I want to be part of this innovative growth industry. With Bitcoin Suisse, I am with a company that will shape the future of the digital financial service industry and create real value for our clients.

**2. How did you personally first hear about cryptocurrencies?**

I heard about the pizza transaction in 2010 when the idea was still in its very early days. Actively involved personally was I in 2013, when we had initial demand from investors for Bitcoin related securities.

**3. When did you first buy crypto?**

My first investment in Bitcoin was in 2015. We invented the first stock exchange listed Bitcoin Certificate, which I bought for myself too. It is still a tremendous success.

***Ian Simpson: As the lead investor in Bitcoin Suisse's very successful Series A funding round, you obviously see great potential, both in the company and the industry. What kind of potential is this?***

***Roger Studer:*** The disintermediation of the financial service industry will continue. Decentralized Finance (DeFI) will create great value for society. Financial services will be available on smart contracts and not only reshape the financial service value chain, but also each and every industry globally. Bitcoin Suisse is very well positioned, we are one of the technological leader, we are innovative, we have a great corporate culture and management, an active community and we are highly profitable. This combination is unique.

***IS: From a traditional investment banker to a director and lead investor at Bitcoin Suisse AG. What was the feedback on your new professional challenge?***

***RS:*** I received numerous positive feedbacks - investors start to understand the great opportunities of the technology and of our company. It's not only about cryptocurrencies, but that is part of it.

***IS: You have a strong background in structured products and there is clearly potential for such products for crypto and digital assets. How easy (or hard) will it be to bring together the "technical" aspects of structured financial products with the tech behind cryptocurrencies and digital assets?***

***RS:*** Switzerland's recent efforts to regulate blockchain and distributed ledger technology (DLT) allow the industry to finish some missing pieces, like a trading infrastructure for digital assets, issuance services, custody services and so on. I'm convinced that by the end of the year, we will see a broad investment universe available as digital assets, as for example structured financial products, but not only.

***IS: There is a lot of talk about tokenizing assets that have been previously unbankable - art, collectibles, even cattle farms. What will it take for these assets to really "take off" - what kind of market infrastructure, societal shift or other factor will be the catalyst?***

***RS:*** I would expect a first wave in the tokenization of existing securities, small and mid-size companies have a great chance now, even without a traditional stock exchange listing, being tradable. A second wave, which might go hand in hand with the first one, for asset classes like real estate, art and so on, who could possibly profit from the lower cost of securitization.

***IS: Of all the assets out there, which do you think lend themselves best to tokenization... equities, bonds, real estate investments, wine collections?***

***RS:*** All of the above - and many more. I am convinced that all assets could be tokenized in some way, at some point. It will probably take some time before that makes sense.

***IS: With the Swiss parliament recently voting unanimously to pass new DLT-focused regulation, do you feel that Switzerland has an advantage over other markets for crypto-financial services?***

***RS:*** I can feel the willingness of most of the stakeholders in Switzerland, but we need also to cooperate with other countries to ensure global standards. The more unified the standards, the higher the benefits of the new technology.

***IS: For Bitcoin Suisse to take full advantage of the potential in the crypto and digital asset market, what will be the key factors?***

***RS:*** Continue and work and communicate as hard as you did in the past. Be close to our clients and to the technology. Bring to life our vision of the digital financial services industry.

***IS: You were recently quoted as saying, "If you run a traditional business model, you need to find the balance between managing new technologies, investing in new business models and harvesting old business models." How much of an appetite do you think there is among financial institutions, large and small for new technologies like blockchain?***

***RS:*** I have experienced a great interest in blockchain technology within the financial industry but also from the economy in general. Most of the traditional companies face a dilemma. Put yourself in the shoes of the owner of a horse-drawn carriage transport company at the beginning of the 20th century. Any investment in motorized trucks challenges and cannibalizes your existing business. It takes courage, foresight and above all independence to implement and execute the business models of the future.

***IS: Where do you see the greatest challenges for further development in digital-financial services?***

***RS:*** I see three elements that are needed for the digitization of the financial service industry, based on blockchain technology.

The tokenization of assets is technically manageable and solved. The exchange of digital currencies or trading of digital assets is or will be available soon. The most challenges I see, are tied to having reliable storage and custody services for the trillions of USD of money and assets from institutional investors.

Digitization of the financial service industry will be driven by the great possibilities of decentralized finance (DeFi).

***IS: Much of the very recent growth in US equity markets has been fueled by retail investors - using new platforms like Robinhood. Do you think this trend may translate into crypto and digital asset markets as well? Or is the real potential mostly from institutional investors such as pension funds and external asset managers?***

***RS:*** The vast majority of volumes on the stock exchanges are still from institutional investors. But yes, retail investors are important and early adapters of new technologies are key for the further development of the digitization of the financial service industry.

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