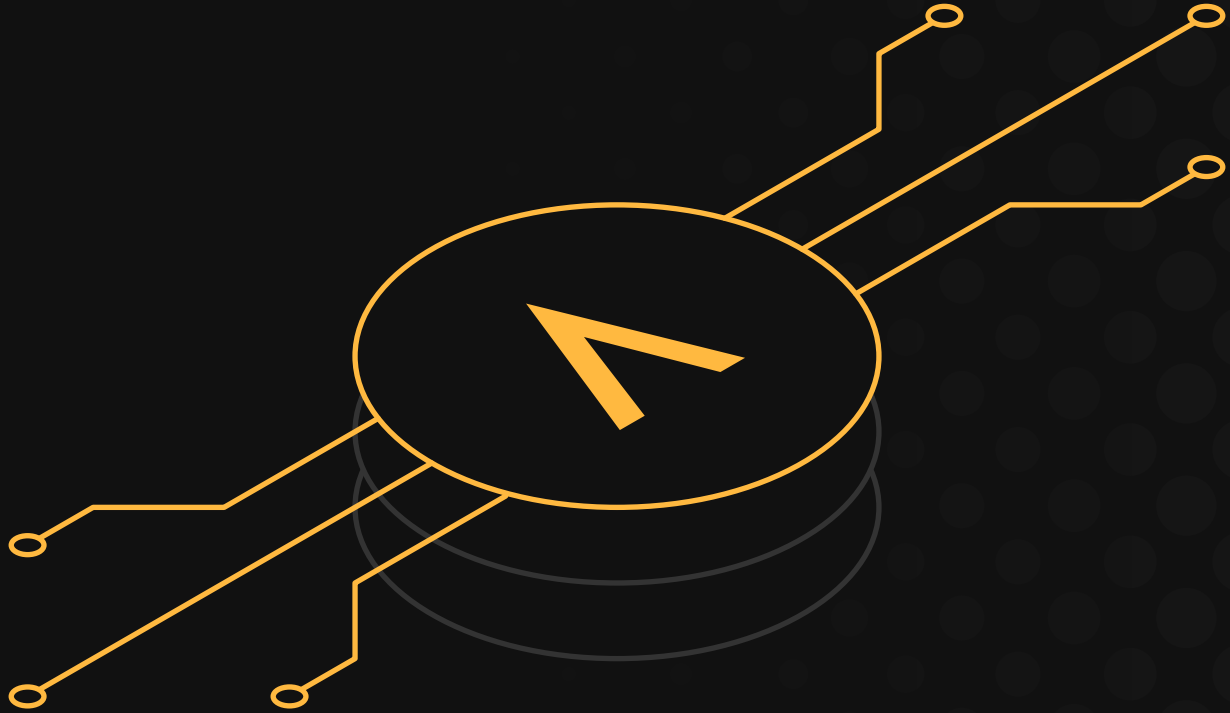


AMUN



Amun's Thesis for the Future of the Crypto Asset Industry.

Lanre Ige, Researcher
Amun AG – July 2019



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This report outlines some of our thoughts on the crypto asset space and where we at Amun think the most potential lies in the future. Our role in the space can be seen as an on-ramp for the kind of capital which thus far has not had access to crypto assets. We believe that allowing new investors to access financial products within the crypto asset space – whether they be Digital Gold, Open Finance instruments, or Digital Commodities – is an important step in the maturation of the industry. In addition, we believe that the opportunities offered by these segments are at the very least worth many trillions of dollars. This research report will explain our thesis for the future of the crypto asset industry and explicate why our conviction in the potential of the sector is justified.



INTRODUCTION

As we come towards the end of the second quarter of 2019, it gives us a chance to reflect on the progress and setbacks the crypto asset space has faced in recent times. Moreover, we are in a good place to analyze the various trends which have remained constant throughout discussions and debates within the industry. On that note, we have noticed two overarching narratives over the last year in particular:

1. Early signs of real demand from institutional capital for crypto assets, as well as the maturation of the infrastructure necessary to support such players.
2. The ongoing launch and continued development of exciting new projects which, in some ways, justify the seemingly irrational exuberance rampant during the token sale craze of 2017.

We believe that these two narratives are inextricably linked. As the crypto asset ecosystem matures, it will undoubtedly benefit from traditional capital market inflows; conversely, institutions which take advantage of the once-a-generation innovation that crypto assets bring stand to benefit also. In line with this thesis, our mission at Amun is to make investing in crypto assets as easy as buying a stock. We provide investors with an easy, secure, and regulated way to access crypto assets. We believe that these two narratives will continue to develop within the industry and act as the primary drivers behind its future growth. This report acts a means to help others better understand the reason for our conviction about the immense potential of this industry. In order to do so, however, we must first take a look at several lessons from history.

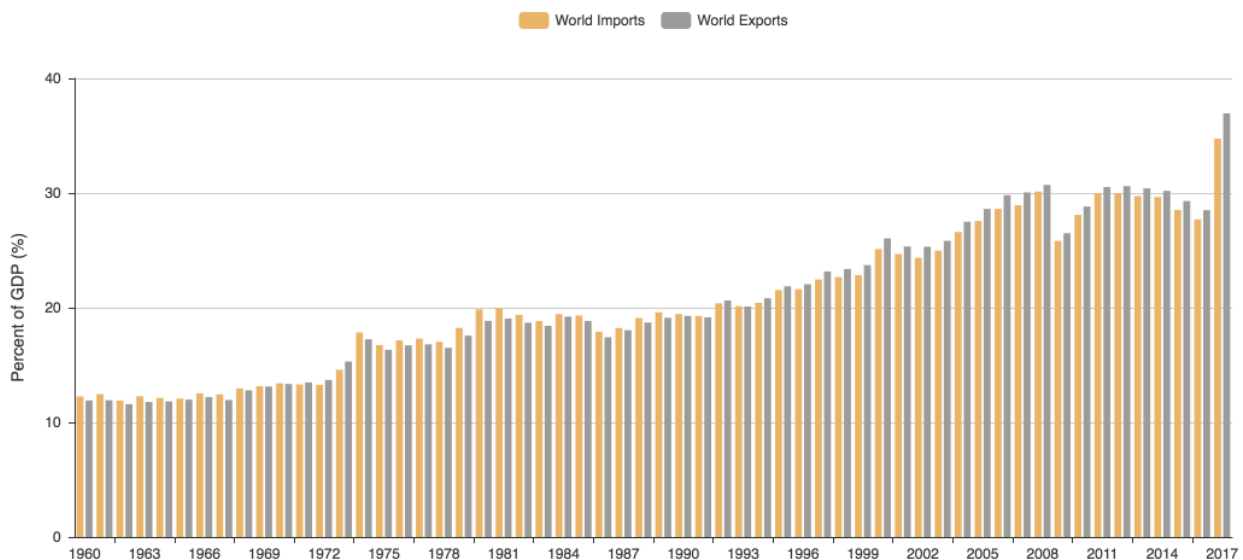


THE CASE OF THE INTERMODAL

One of the great innovations in the second half of the twentieth century was the creation of the modern intermodal shipping container by transport entrepreneur Malcolm Mclean in 1955. Mclean's idea was to create shipping containers which could be used across many different modes of transport – on ships, trains, or trucks – without the need to unload then reload cargo in between the different vehicles. Over 70 years after the invention, an estimated 1.7 billion tons of goods reach their destination via a shipping container each year, and it is estimated that there are over 20 million containers currently in use worldwide¹. In essence, the success of the intermodal shipping container is predicated on the fact that the innovation was able to drastically reduce the marginal costs of commercial transportation; not only did this allow for more efficient commerce around the world, it also redefined the concept of global commerce, especially in regions like South-East Asia².

World imports and exports have been on a consistent upwards trend (Fig. 1) since 1960 when data first became available, which also coincides with the invention of the intermodal shipping container. While it is difficult to ascertain what percentage of this effect is attributable to the innovation, it is clear that it had a large influence on helping create the open global economy we see today. Key to this new paradigm were drastic reductions in the marginal costs of commercial transportation. The interesting thing about such innovations is that it is often impossible to determine their impact a priori. At the time, the shipping container would have been thought to decrease the cost of transportation from New York to South Carolina only marginally – perhaps a 10% to 20% total efficiency gain; no one could have predicted that it would, in turn, reduce transport costs from New York to Amsterdam by 900%³.

Figure 1: World Imports and Exports as % of GDP



THE SHARING ECONOMY

The success of sharing economy companies – such as Uber and Airbnb – best exemplifies the theme of (marginal) cost-reducing innovation and its ability to unexpectedly transform economies.

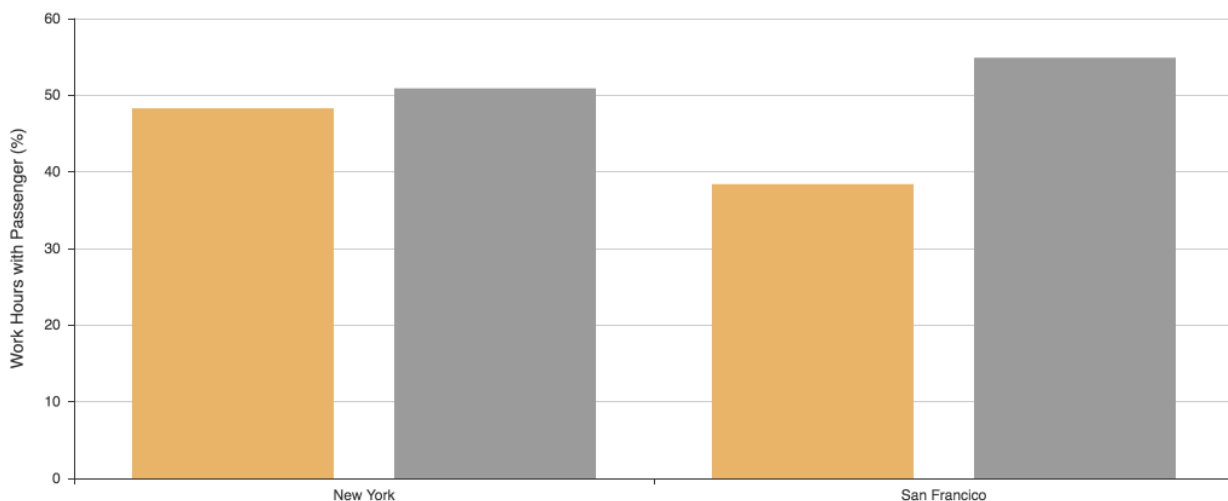
Uber helped reduce the marginal cost of a taxi driver finding riders and the marginal costs of riders finding appropriate taxi drivers – with these costs ranging from advertising to cognitive load to trust.

The means by which sharing economy companies like Uber managed to accomplish what they did can be summarized as follows:

- Finding ways to massively improve demand-supply matching within their respective 2-sided markets.
- Taking advantage of the potential for a flexible (labour) supply model (i.e. anyone who owns a car or a house can potentially be a supplier).
- Being able to scale extremely quickly and effectively due to the venture funding model.
- Taking advantage of regulatory arbitrage to help sculpt regulation which better serves its business model – though this strategy has generally come with a great number of negative externalities.

The graph (Fig. 2) illustrates how simple improvements in demand-supply order matching and a reduction in advertising costs for drivers can lead to noticeable increases in positive economic activity – in this case, the percent of work hours a taxi driver spends with a passenger⁴. What the graph does not effectively convey is the sheer impact the compounding effect of reduced marginal costs can bring; such as helping redefine the late-night social scene in a city like London to changing a generation of young peoples' view on car ownership – as well as creating a new industry which has created billions of dollars of value.

Figure 2: Uber vs. Taxi



NON-GOVERNMENTAL MONEY

Forms of money are thought to have existed for more than 30,000 years primarily as mediums of exchange^{5, 6}. Under the framework we've used to analyse other historical examples, we can understand the innovation of early (non-governmental) money as a way to dramatically reduce the marginal cost of social scalability in large groups of people⁷. Forms of money allowed people to more effectively exchange value – created by work they've done – between each other or conserve said value over time, for use at a later date. All these aforementioned examples of the intermodal shipping container and the sharing economy demonstrate the power that marginal cost-reducing innovation offers.

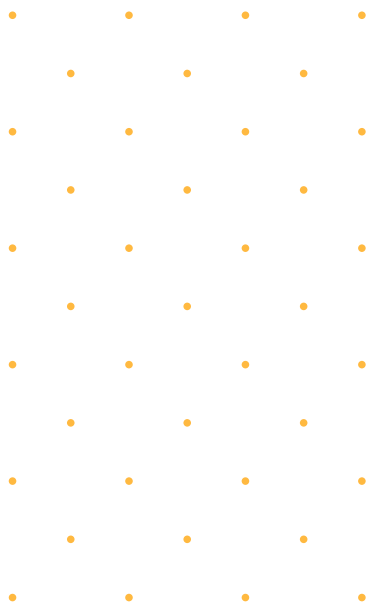
Technologies which simply reduce marginal costs of given social and economic activity can have profound impacts on the ways humans interact. It's for this reason why we think that crypto assets are so important: they have the potential to drastically reduce the marginal costs involved with engaging in financial services and creating financial products. Like other early forms of non-governmental money, crypto assets offer massive improvements in social scalability by designing products aimed at trust-minimization, thus reducing their operation's reliance on trusted third-parties.



DIGITAL GOLD

The most promising example of the crypto asset industry's ability to build socially scalable financial products is Bitcoin and its promising role as a store-of-value. Bitcoin is often called a Digital Gold given the similarities between it and gold (as well as other assets which have fulfilled the Store-of-Value function in capital markets). Some of these properties include:

- A predictable and/or easily verifiable monetary policy and supply schedule.
- (Quasi-) Fungibility, Portability, and Divisibility.
- A degree of self-sovereignty and protection from state control.

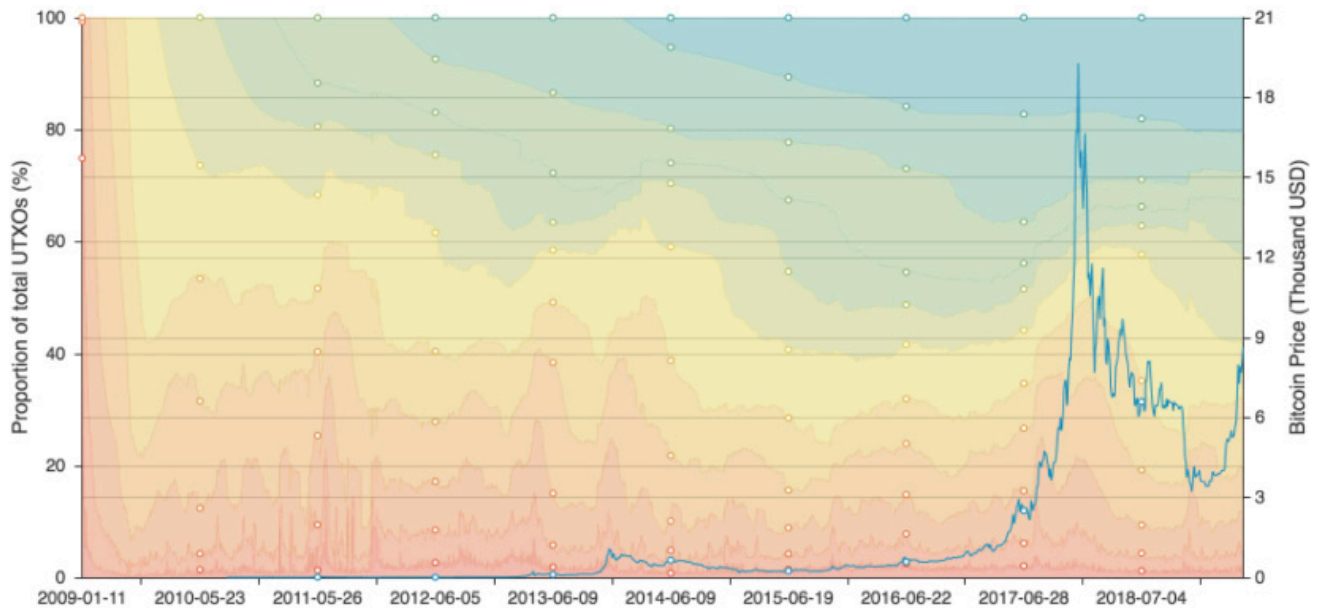


Moreover, there are several properties latent in Bitcoin which arguably make it superior to Gold as a Store of Value:

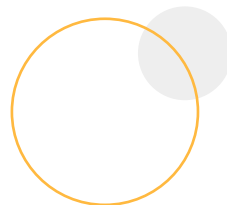
- Extremely-low-to-non-existent counterparty risk. With Bitcoin, one's private keys are the only thing which determine whether or not one's funds – or more specifically one's unspent transaction outputs (UTXOs) – can be spent.
- High-degree of censorship resistance. Due to Bitcoin's digital nature, physical theft becomes extremely difficult. Given the massive strides made in reliable third-party custodian and self-custody solutions, it is difficult to steal bitcoin. In most cases, incidences of theft have been due to users trusting exchanges or third-parties that don't have suitable security protocols or the necessary regulation; such incidences are becoming rarer each day.
- Divisibility and Portability. Bitcoin's native smallest subunit is 1×10^{-8} BTC (1 satoshi). Moreover, the Lightning Network makes possible transactions worth as little as 1/1000th of a Satoshi.

DIGITAL GOLD

Figure 3: Bitcoin Holding Behaviour



The above chart (Fig. 3) gives us an insight into some of the economic behaviour of those who use Bitcoin. The chart shows the time periods over which users have held onto their given amount of Bitcoin without spending it as a proportion of the total Bitcoin in circulation. By measuring how the value of the total Bitcoin UTXOs changes over time, one can get a sense for how spending or holding (sometimes called "HODL'ing" by the crypto community) behaviour has developed on Bitcoin – dubbed the "Hodl waves". While it is difficult to distinguish lost private keys and UTXOs which have voluntarily not been spent, the data does suggest a significant amount of bitcoin – especially in recent years – has been held for large periods of time⁸. This behaviour is likely to be even more pronounced when compared to other crypto assets generally agreed upon to be significantly weaker Stores of Value.

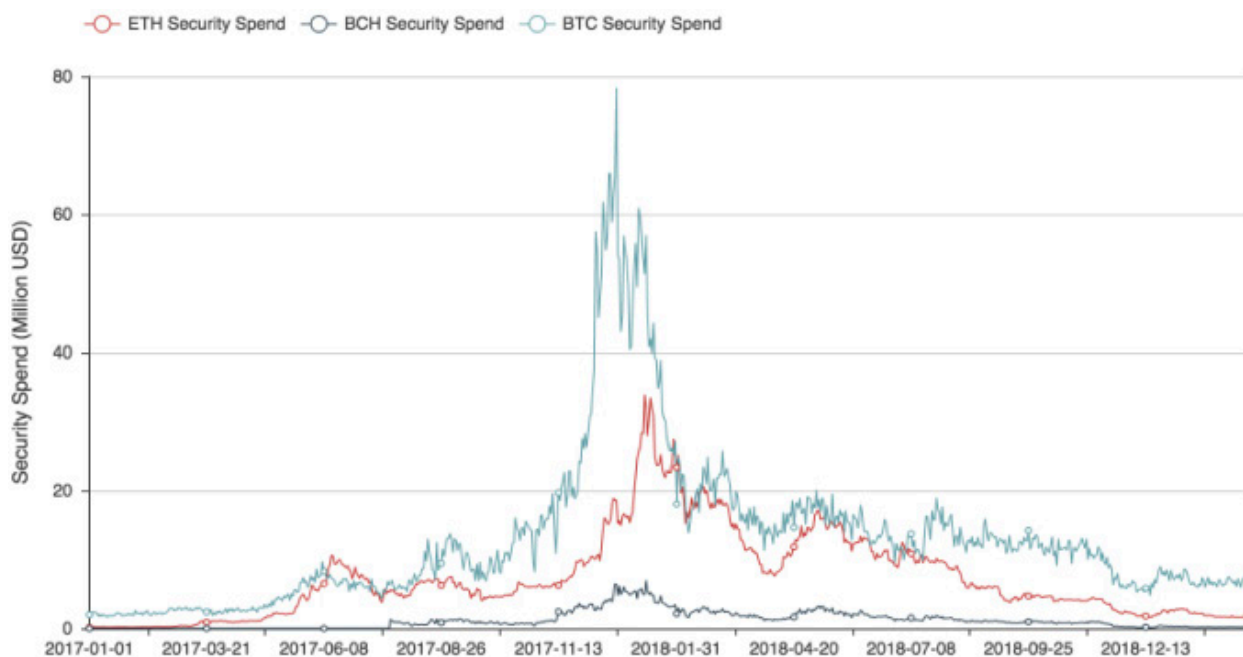


DIGITAL GOLD

Another important point to note is that the trade-off for the social scalability security intrinsic in Bitcoin is the computation cost borne by miners. In turn, the block rewards – units of a given crypto asset created via monetary inflation to reward miners – and transaction fees can be seen as a proxy for the total amount of value those using the Bitcoin network are willing to compensate miners for, to ensure its economic security. The following graph (Fig. 4) compares the amount users of Bitcoin, Bitcoin Cash, and Ethereum directly and indirectly spend to maintain the security of their crypto asset networks per day through transaction fees and inflation (block reward). We estimate that Bitcoin's total security spend for 2018 was around \$5.8 billion compared to \$3.8 billion for Ethereum, \$531 million for Bitcoin Cash (ABC), \$570 million for Litecoin, and \$624 million for Zcash.



Figure 4: Crypto Security Spend



DIGITAL GOLD

The chart (Fig. 5) below compares monetary base (M1) inflation in several countries to that of Bitcoin. The chart makes obvious the point that the strength of Bitcoin's monetary policy lies not in necessarily low monetary base inflation per se, rather in the reliable and programmatic nature of it. Bitcoin's inflation has been on a steady decrease year-on-year since its inception and there is a certainty that the block reward will continue to halve every 210,000 blocks without fail.

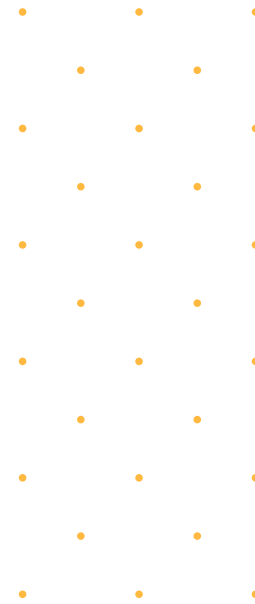
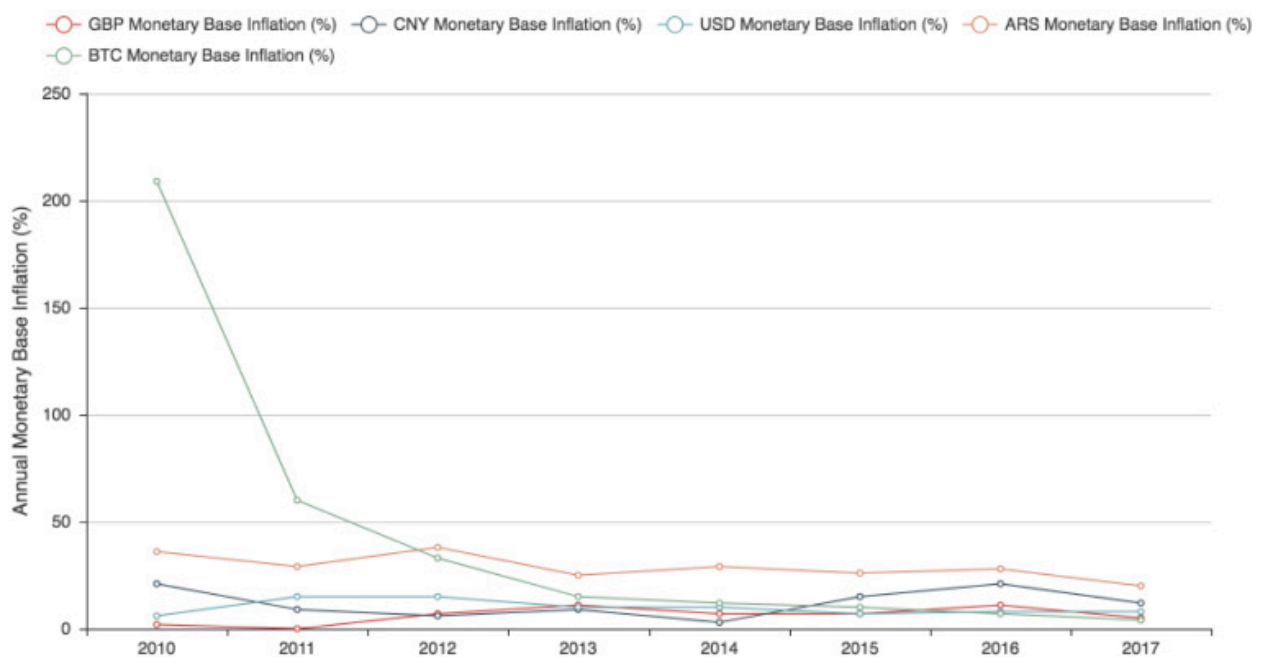


Figure 5: Monetary Base Inflation

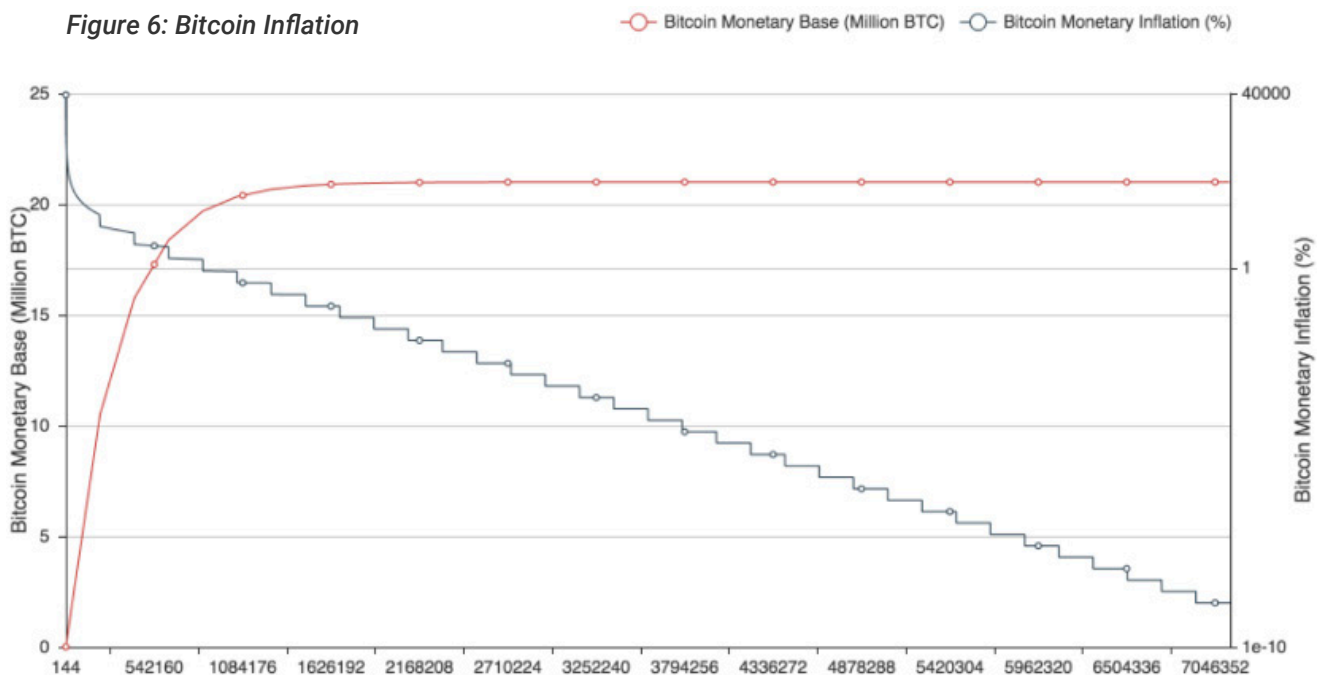


DIGITAL GOLD

Despite Bitcoin and other crypto assets' use of inflation funding, the programmatic and openly verifiable nature of the block reward is a massive improvement over the often-opaque policy of some state-run monies. The below graph (Fig. 6) further elucidates Bitcoin's monetary policy. Given its aforementioned properties, Bitcoin is in an ideal position to capture a substantial amount of the value of Gold and other assets which fulfil the Store-of-Value function in the long term. One cannot overstate the important function that a reliable store-of-value can play in countries with unmanageable price inflation – such as the oft-repeated example, Venezuela. As such, the promise of a Digital Gold is perhaps the crypto asset industry's most important contribution thus far.

The World Gold Council estimates⁹ that about 190,040 tons of gold has been mined throughout history which places the total value of all mined gold at around \$8.10 trillion¹⁰ – compare this to Bitcoin's current market cap. Given the burgeoning institutional finance infrastructure building around Bitcoin in the form of exchange-traded products, derivatives (including futures), and other investment vehicles, over the next few years, we can expect to see value and capital diverge from Gold into Bitcoin.

Figure 6: Bitcoin Inflation



DIGITAL GOLD

However, despite Bitcoin's ideal place as a Digital Gold, it is likely that other similar crypto assets will fill certain niches for an alternative Store-of-Value – namely privacy – due to Bitcoin's somewhat limited privacy (or fungibility) currently. There are a number of privacy coins such as Zcash, Monero, and Grin which are well placed to act as Stores-of-Value for users who require higher levels of privacy than Bitcoin can provide; some estimates place offshore wealth at around 8% of global wealth or at around \$7.6 trillion (as of 2015)¹¹. It is entirely possible that large amounts of offshore capital flows into privacy coins as they can potentially provide greater privacy and security guarantees in the long term – especially once Bitcoin has spearheaded institutional adoption within the crypto asset space.

Zcash is one of the more promising privacy-preserving crypto assets but adoption of its privacy-preserving features (e.g. the use of Z-addresses) is still extremely early; for example, as the graph below (Fig. 7) illustrates, Z-address adoption (as a percentage of total daily created UTXOs) has generally been below 1%¹². However, this says nothing about the amount of value being transferred between Z-addresses – which is impossible to calculate.

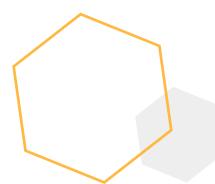


Figure 7: Zcash Z-Address Adoption



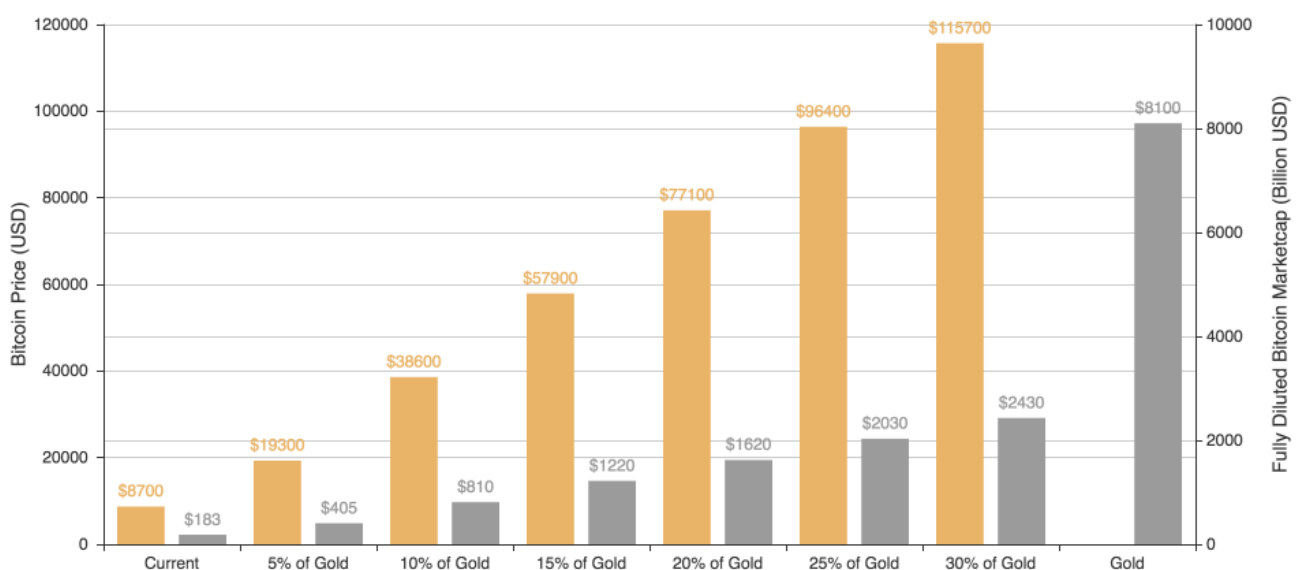
DIGITAL GOLD

Despite the promise of crypto assets like Bitcoin and privacy coins to fulfil the function of Digital Gold, it should be clear that Gold plays a very different function in the global economy to what it did in the 20th century. Whilst the panic of 1893¹³ was effectively ended by the J.P. Morgan-sponsored US treasury purchase of 3.5 million ounces of Gold¹⁴, Gold no longer plays as integral a role in U.S. and global monetary policy as it did previously. Whilst Gold is still regarded to some extent as a Store of Value¹⁵, Bitcoin stands to benefit from the increasingly weak narrative surrounding Gold by offering a viable alternative. The role Gold now plays is predominantly as a hedge against potential global economic downturns, and this role can arguably be shared with Bitcoin – at least within the local maximum of the crypto asset space. We can estimate future possible prices levels of Bitcoin by considering what amount of the Gold market it could possibly penetrate in the medium term.

The diagram (Fig. 8) below highlights Bitcoin's potential fully diluted supply market cap and price at different levels of penetration of the gold market from 5% up to 30%.

We can consider these estimates still relatively conservative given Bitcoin's potential to dominate the whole gold market eventually. For example, at 30% penetration of the Gold market Bitcoin would have a market cap around \$2.4 trillion, putting an individual bitcoin at over \$110,000. Under this model, if one invested in Bitcoin today, their returns would be nearly 3,700%. We believe that such price levels are possible given the fundamentals of Bitcoin we have already mentioned as well as its sustained growth over the last decade.

Figure 8: Bitcoin Gold Penetration



OPEN FINANCE AND DIGITAL COMMODITIES

The potential of Digital Gold also serves as a peek into further financial innovations which have gained steam throughout the last year; these innovations can generally be classified as Open Finance. Open Finance refers to a growing narrative surrounding applications that are built on top of crypto asset networks which aim to rebuild the primitives which underlie finance. Examples include decentralized exchanges (0x¹⁶, Uniswap¹⁷, protocols for debt issuance (Maker¹⁸, Dharma¹⁹, Compound²⁰), prediction markets (Augur²¹), and payment solutions (Lightning²²). Over the last year several of these applications have become increasingly popular despite the industry's ever-growing pain points such as scalability, user-experience, and privacy.

To some extent Open Finance can be argued to be the perfect product-market fit for smart contracts given that users of financial products may have a higher tolerance for issues such as scalability and user-experience since those issues also exist in traditional finance.

The chart (Fig. 9) below shows the growth in the amount of capital underpinning some of the most popular Open Finance applications.

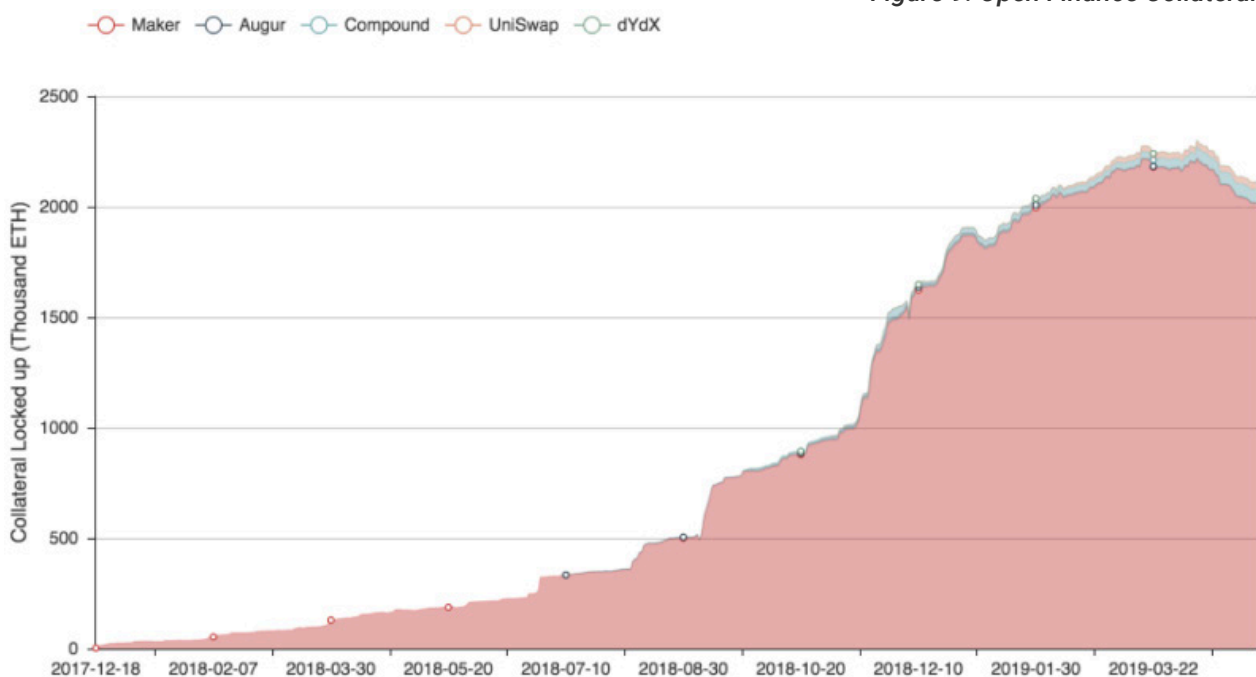


Figure 9: Open Finance Collateral

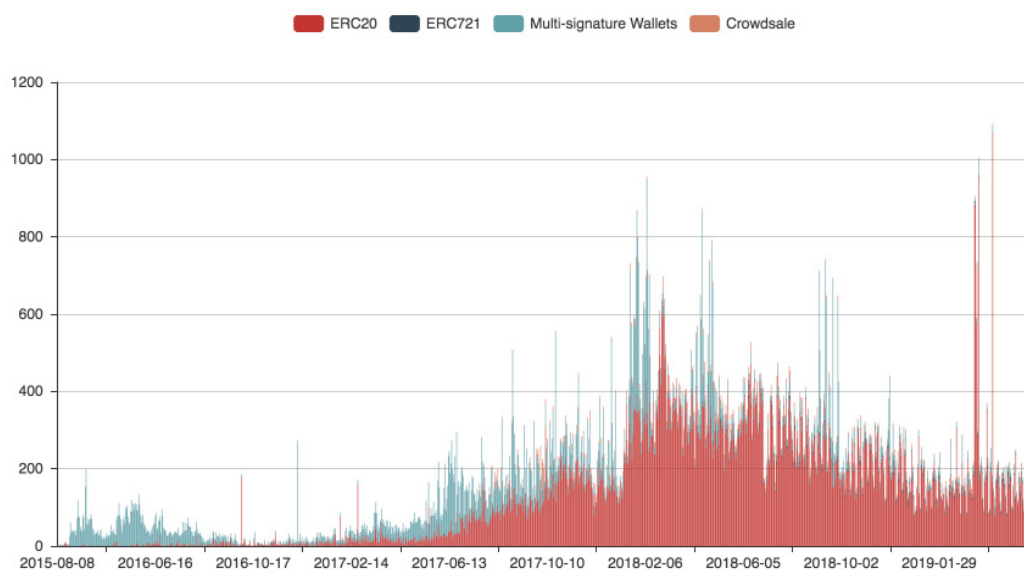
OPEN FINANCE AND DIGITAL COMMODITIES

Whilst Maker is definitely the Open Finance product with the most traction – currently over 2,000,000 ETH are held in Maker Collateralized Debt Positions – it is likely that other products will continue to gain traction in the coming months. The success of Maker can be put down to the niche it currently caters to – as a censorship-resistant stablecoin – and the open nature of the platform demonstrated by its weekly governance calls²³, open-source code²⁴, & the variety of applications which have since been built on top of it²⁵. We expect other Open Finance platforms like Augur and Uniswap to also have experienced large upticks in growth over the last year, especially as interfaces²⁶ developed on top of them which target specific niches and target the user-experience to them – Veil is one early example of this²⁷. For better or for worse, the token sale bubble of 2017 is a reminder of the power open and interoperable protocols have to quickly generate real virality and accrue substantial value. What Open Finance protocols do is drastically bring

down the marginal cost of creating new financial products from thousands of dollars²⁸ to thousands of “gwei” – the subunit representing 10⁻⁹ of a single unit of ETH²⁹. As engineers and analysts with subject-matter expertise discover Open Finance we can imagine that the products will continue to improve in terms of utility, sophistication, and reliability. As time goes on, studying these platforms offers us a chance to push the boundary of finance forward.

The modularity of these financial products and the standards upon which they are built will spur innovation whilst also drastically reducing the costs involved in issuing new financial instruments. In Ethereum’s case, its various standards such as ERC-20 and ERC-721, have been key to reducing the barriers to entry involved in launching financial instruments. Below we plot (Fig. 10) the number of issuances of several popular kinds of smart contract on Ethereum.

Figure 10: Ethereum Smart Contracts



OPEN FINANCE AND DIGITAL COMMODITIES

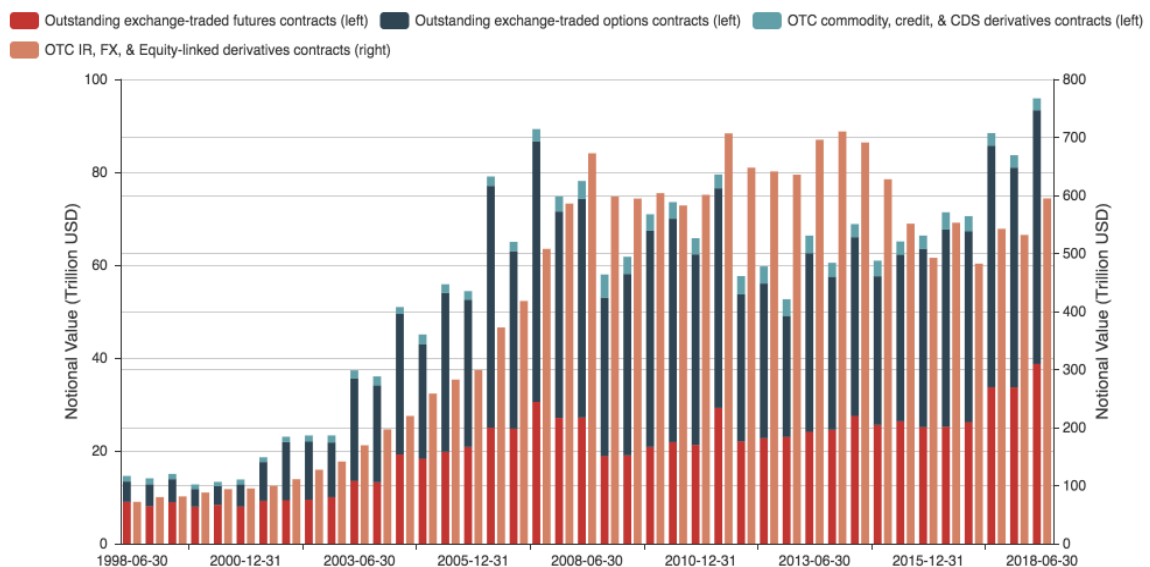
Many of the most successful Open Finance products are those which create derivatives on top of existing crypto assets with other functions; for example, the Maker system and token can be seen as somewhat akin to a synthetic debt instrument for an asset-backed smart contract (the collateralized debt position). As such, when doing a market sizing of the Open Finance space we can use the size of the global derivatives market as a guidance. We believe that derivatives for both crypto-native assets as well as securities which may settle on a blockchain is a multi-trillion-dollar value creation opportunity.

The below chart (Fig. 11) demonstrates the size of both the OTC and exchange-traded derivatives markets with data from the Bank for International Settlements.

Given the size of derivatives in traditional capital markets, it is feasible that the Open Finance opportunity could be worth tens of trillions of dollars, especially given the prospect of tokenized securities allowing for open finance protocols to be interoperable with the traditional finance world.



Figure 11: Derivatives Market Notional Value



OPEN FINANCE AND DIGITAL COMMODITIES

Digital Commodities build upon the infrastructure that Open Finance will create. Finally, whilst still very much in the early days, the prospect of crypto asset networks creating new markets for digital commodities – like file storage³⁰, private bandwidth,³¹ & domain naming³² – is an exciting area. The most noticeable example of this is Filecoin which may see a beta launch by the end of 2019. These products offer a chance to rewire the foundations of the internet in such a way that the negative externalities created by centralized “Big Tech” infrastructure can be limited. However, it is unlikely that a service like Filecoin will be able to claim any efficiency or cost-saving gains over AWS (or any other centralized storage provider) in the short-run; however, the long-tail of this innovation is potentially limitless. We are excited to see how the Digital Commodities market develops over the next two years, whether it deals with the issues of scalability, and in what ways its products overlap with that of Open Finance. Like the markets for Digital Gold and Open Finance, Digital Commodities offer a real opportunity to transfer massive amounts of value from another industry – in this case various segments of IT infrastructure.

Examples include: File Storage (Filecoin, Storj), Computation (Golem, iExec, Bandwidth routing (Orchid, Sentinel, Rightmesh), and Video transcoding (Livepeer). Moreover, non-fungible tokens and tokenized collectibles can also be seen as Digital Commodities and come with their own grand opportunities. There are questions especially for File Storage and Computation as to whether the decentralized options will ever be able to provide a meaningful advantage over their centralized counterparts – given how cheap file storage on Amazon S3 is and how powerful the effects of economies of scale can be. Whilst the potential of the Digital Commodity sector is likely much smaller than that of both Digital Gold and Open Finance, we believe that Distributed Compute, in particular, will offer value for particular niche use cases and will offer new financial instruments upon which new Open Finance products may be built. While this segment may be the most ambitious of all plausible opportunities within the crypto asset space, we believe that it could create between \$1 trillion to \$2 trillion of value.

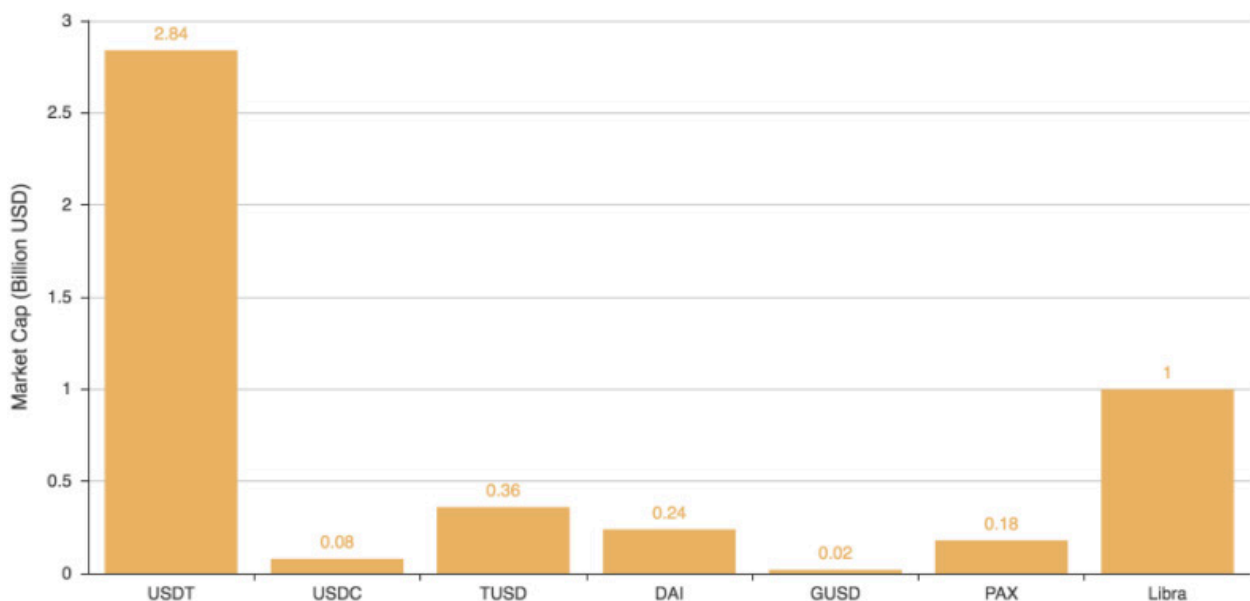


WEB 3.0, ENTERPRISE CRYPTO, AND SELF-SOVEREIGN OWNERSHIP

The final trend and perhaps the one which we believe will lead to the largest increase in mainstream interest in crypto asset in the near future is that of enterprise crypto. We define enterprise crypto as being the realization by large enterprises that crypto assets present them with many potential opportunities. Progress on enterprise blockchain – wherein enterprises have attempted to take advantage of blockchain technology in the form of private and consortium blockchains – has been slow and often misses the core of the value that blockchains and crypto assets bring – censorship-resistance, fault-tolerance, and decentralization. However, organizations like Facebook and Square have recognised the advantages and have been actively either building their own crypto assets or contributing to others.

Moreover, companies like JP Morgan, Microsoft, and Amazon have all been developing software which, if not decentralized in its entirety, borrows heavily from decentralized technology and remains compatible – such as Quorum for example. We believe that such technologies are extremely important stepping stones to a more open internet. Facebook alone could have a massive impact on the mainstream penetration of the crypto asset industry, as their ostensible pivot towards privacy and decentralization will expose more people to other crypto assets. Facebook's stable coin project, Libra, is aiming to be backed at inception by at least \$1 billion worth of assets, which would immediately make it the second largest stable coin as shown in the chart (Fig. 12) below.

Figure 12: Stablecoins Market Capitalization



WEB 3.0, ENTERPRISE CRYPTO, AND SELF-SOVEREIGN OWNERSHIP

We believe that enterprise adoption of crypto will mark the beginning of Web 3.0 wherein web-based applications are built upon the foundation of self-sovereign ownership and user control over data created on platforms like Facebook. However, crypto-native initiatives will continue to lead the way for incumbents and force them to adapt their business models to ones compatible with Web 3.0. An advantage of a Web 3.0 world is that it will allow users to interact with social networks whilst still having complete sovereignty over their data – how its presented and how it is used by others (if at all). This will limit the extent to which internet monopolies are able to act against the interest of their users by influencing election voting behaviour or engaging in non-consensual surveillance.

The efficacy of these monopolies is a direct result of the behavioural surplus³³ they can easily extract from users, damaging the means for this surplus will weaken their grip on markets and lead to a more competitive landscape. Projects like Livepeer, Dfinity, and PFS are some examples of what is and will be possible on Web 3.0. The journey to an internet powered by Web 3.0 technologies could take much longer than the revolutions offered by both Digital Gold and Open Finance; nevertheless, once mature, the Web 3.0 stack will create trillions of dollars worth of value.





CONCLUSION

This report has outlined some of our thoughts on the crypto asset space and where we at Amun think the most potential lies in the future. Our role in the space can be seen as an on-ramp for the kind of capital which thus far has not had access to crypto assets. We believe that allowing new investors to access financial products within the crypto asset space – whether they be Digital Gold, Open Finance instruments, or Digital Commodities – is an important step in the maturation of the industry. In addition, we believe that the opportunities offered by these segments is at the very least worth many trillions of dollars. We hope this piece has shown the reader exactly why our strong conviction is justified.



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DISCLAIMER AND ENDNOTES

This report has been prepared and issued by Amun AG for publication globally. All information used in the report has been compiled from publicly available sources that are believed to be reliable; however we do not guarantee the accuracy or completeness of this report. Crypto asset trading involves a high degree of risk. The crypto asset market is new to many and unproven, and may not grow as expected. Currently, there are relatively few use cases for crypto assets in the retail and commercial marketplace when compared to their large use by speculators, thus contributing to price volatility that could adversely affect an investment in crypto assets. In order to participate in the trading of crypto assets, you should be capable of evaluating the merits and risks of the investment and be able to bear the economic risk of losing part or all of your investment.

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29. <https://www.investopedia.com/terms/g/gwei-ethereum.asp>
30. <http://filecoin.io>
31. <https://handshake.org>
32. <https://www.orchid.com>
33. Data about user behaviour created by user interactions with a given application which can then be leveraged for future commercial benefit.



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