TECHEMY CAPITAL

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TECHEMY ADVISORY

STABLECOINS:
Mitigating Capital Risks in Crypto

TECHEMY GROUP PROPRIETARY RESEARCH 2019

Credentials

Authors

Donn Krassiyenko, *Techemy Capital*

Michael Carr-Smith, *Techemy Capital*

Andrew Gillick, *Brave New Coin*

Stephen Lane, *Techemy Advisory*

Contributors

Adam Dodds, *Brave New Coin*

Aditya Das, *Brave New Coin*

Bryce Galbraith, *Techemy Advisory*

Caleb Wilkinson, *Techemy Capital*

David McNickel, *Brave New Coin*

Fran Strajnar, *Techemy*

James Tofield, *Brave New Coin*

Josh Olszewicz, *Techemy Capital*

Matthew Paget, *Techemy*

Nawaz Ahmed, *Techemy Advisory*

Richard Mannell, *Techemy Capital*

Sherwyn D'Souza, *Techemy Capital*

Contact Details

Adam Dodds, *General Manager*

adam@bravewnewcoin.com

Techemy Limited

www.techemy.co

Ground Floor, 162 Victoria Street West

Auckland, 1010, CBD, New Zealand

Executive Summary

Cryptographic assets (crypto assets) have a market capitalisation of just under US$130B, and are the fastest growing segment of the fintech landscape in terms of projects, institutional adoption and investment. By virtue of their programmable nature, crypto assets are efficient and scalable vehicles for storing and capturing value, and are thus subsuming traditional finance.

Within the crypto ecosystem the subset of crypto assets known as stablecoins currently have a US$3B market capitalisation — which has grown roughly 50% since March 2018. Until recently, the market was predominantly represented by the Tether stablecoin, a pioneer of cross-border payments, and backed by USD. Its dominance has been challenged, however, by new market entrants such as DAI, TrueUSD, and USDCoin, which has resulted in a notable decline in Tether's market share from circa 90% in September 2018 to around 65% in February 2019.

In broad terms, stablecoins facilitate currency conversion and seamless value exchange across the wider economy, addressing the requirements of international finance participants without the need for fiat currency holdings or accounts. The variety of applications that stablecoins are used for ranges from risk mitigation to arbitrage on exchanges across the digital space, and from reducing cost of remittance to facilitating currency conversion in the physical world. Their usefulness has already been proven to crypto investors, funds, broker-dealers, and other financial service providers, and with traditional conglomerates such as JP Morgan, IBM, and Facebook moving into this space, the adoption of stablecoins is set to proliferate into adjacent vertical markets including international trade, online media, and retail/wholesale.

Over the 2019-2022 period, Techemy envisions the following trends to emerge:

- At the global level, new index/digital SDR (Special Drawing Rights) stablecoins like Saga will be initiated as they provide a better hedge against uncertainty in the US markets;
- More private/semi-private blockchain stablecoins akin to the JP Morgan coin will be launched;
- At the national level, stablecoins will gain adoption as tools for Point of Sale transactions for non-bank payments;
- At the business level, major fiat currency collateralised stablecoins such as Tether, USDC and TrueUSD will begin adopting retail banking style revenue models; and
- Crypto-collateralised stablecoins such as DAI will be backed by multiple crypto assets.

The stablecoin market is still in the exploratory phase, with no single stability mechanism available to satisfy the requirements of all stakeholders, although the end-goal is the same - to facilitate the transfer of value without exposure to price fluctuation and environmental change affecting the market sentiment. This remains a challenge as several stablecoins have either lost their pegs (e.g. Nubits) or fallen victim to scrutiny from the regulatory authorities (e.g. Basis). Indeed, there are lessons to be learnt from the history of fiat-currency pegs, which this report examines in detail.

Although there are several successful stablecoins, their long-term viability is debatable, given evident difficulties with commercialisation and the sustainability of their underlying revenue models. What is certain is that stablecoins represent a critical path in global adoption of crypto.

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Introduction

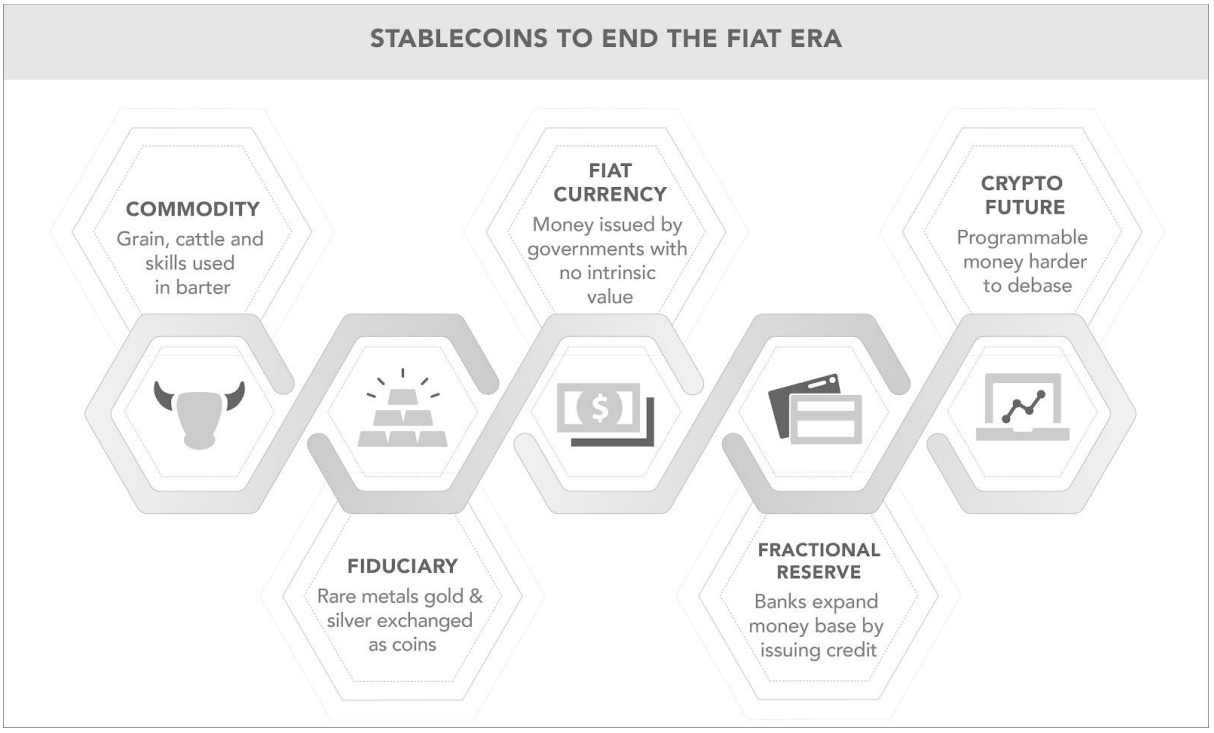
What is a Stablecoin?

A ‘stablecoin’ has different utilities to market participants. To traders, they are an expedient for on-ramping to exchanges and for short-term hedging and liquidity.

To investors and issuers, stablecoins are an opportunity to create and market a product as the “holy grail of cryptocurrency” - a digital asset with a price stability mechanism to negate volatility and be used as a medium of exchange and remittance.

And to the economists, stablecoins are a foray to solving the “impossible trinity” of macroeconomics: a currency that can maintain a fixed foreign exchange rate, free capital movement (absence of capital controls), and independent monetary policy through the creation of an ‘algorithmic central bank’, or DAO, which issues its own currency used as an autonomous supranational unit of trade.

Stablecoins are not a concept unique to cryptocurrency. They are the continuation of a century-long effort to create a supranational currency with a stable price that isn’t subject to the speculative volatility of national currencies used as a medium of exchange and trade settlement. If the right formula is found for a stablecoin we could witness the end of the fiat money system and the start of an epoch of cryptocurrency in the real world.



The First ‘Stablecoins’: Bancor and Terra

In the 1940s, Keynes proposed a supranational global reserve unit of account called 'the Bancor', a sort of precursor to the IMF's Special Drawing Rights (SDR). While not conceptually a currency, it was to be used as a unit for international trade settlement - individuals could not hold or trade in Bancor. The US had intended to adopt it, but after WWII and Bretton Woods, the USD was made the de facto global reserve on the premise it was redeemable for gold.

Contemporary iterations of Keynes' Bancor have also been proposed. Economist Bernard Lietaer's Terra Trade Reference Currency (TRC) was designed in 2000 as a supranational ‘complementary currency’, intended to work in parallel with the current international monetary system that was free of the geopolitical and speculative vagaries of national currencies. Lietaer is also known as the "Architect of the Euro", a currency he intended to be used as a pan-European complementary currency and not to replace national currencies as subsequently happened.

Although never implemented, the Terra was proposed as a currency pegged to a basket of commodities including gold and had a demurrage (depreciation) rate of 4% per annum to avoid hoarding and incentivise its use as a "countertrade" unit of account for international trade. The demurrage charge also covered the storage costs of the underlying physical assets.

The multi-commodity basket was intended to provide inflation protection as well as being a more resilient peg to break in a speculative attack. Its grand design was to “counteract the booms and busts of the business cycle and stabilise the global economy.”

Bancor and Terra have inspired cryptocurrency and stablecoin projects both in name and concept.

Political Drivers for an International Stablecoin

Since the USD was depegged from gold in 1971, the world has been flooded with dollars (and Eurodollars), and the Federal Reserve (Fed) has grown in importance to become the world’s de facto central bank. When the Fed expands its balance sheet, the amount of USD in the world increases. When the Fed tightens, this creates a shortage of USD, and puts a strain on countries that need it for reserve. The Fed’s interest rates also have a disproportionate effect on foreign rates and US-denominated debt abroad.

This conflict of interest between the wants of domestic policy in a country that is the global reserve currency and the needs of foreign countries that require its currency for reserves is known as Triffin’s Paradox.

Major nations are aware of the exorbitant privilege the US commands as global reserve now more than ever as it can issue debt in its own currency and print more to pay it off. The outlook is more precarious for the future of the US’ reserve status in the medium-term as rival powers in Europe, China and Russia have been creating their own trade agreements and alternatives to the US-denominated SWIFT network.

Recently, both China and Europe have overtly expressed both in words and actions their dissatisfaction with the "USD hegemony" and a desire to change the status quo.

In a September 2018 speech, the President of the European Central Bank, Claude Juncker, was unequivocal with Europe's intentions:

> *"It is absurd that Europe pays for 80% of its energy import bill – worth 300B euro a year – in US dollars, when only roughly 2% of our energy imports come from the United States. It is absurd, ridiculous that European companies buy European planes in dollars instead of euro. This all needs to be changed".*

Similarly, China for years has been calling on more international use of the IMF's Special Drawing Rights (SDRs) for trade settlement. SDRs are essentially a receipt for a claim on a basket of the world's major currencies - USD, EUR, GBP, JPY and RMB - and are considered an alternative to the USD as they are inversely correlated in price to the USD Index (DXY). However, they haven't been widely used and if anything are used as a hedge against USD volatility.

Today's Opportunity

Globally, over US$1.4T is traded per day in currency markets (which dwarfs the value of all the world's stock markets combined), and 96% of all transactions are purely speculative. This speculative use of national currency leaves ordinary citizens open to all sorts of attacks on their wealth - as we've seen repeatedly with South American currencies.

Stablecoins, and cryptocurrencies in general, hold great promise to citizens and governments alike to create currencies better suited as mediums of exchange that are harder to debase and attack. Blockchain technology presents a chance unique in history to decouple money's role as a store of value from a medium of exchange through the decentralisation of monetary policy and currency issuance.

Stablecoin Use-Cases: What Are They For?

There are eight distinctive use-cases for stablecoins, depending on the target audience and required features. These can be divided into two groups: application in the real world and application in the digital world.

DIGITAL WORLD APPLICATION	PHYSICAL WORLD APPLICATION
Reduce exposure to crypto volatility	Reduce the cost of remittance transaction
Exploit crypto exchange to exchange arbitrage opportunities	Improve international trade
Store of value for crypto investors	Reduce currency conversion rates
	Improving online retail
	Reduce inflation in developing countries

Digital World Application

Reduce Exposure in Crypto Volatility

What? Major stablecoin trading pairs such as Tether/Bitcoin and Tether/Ether are highly liquid and are some of the most traded pairs in cryptocurrencies currently. They are designed to hold their value in the medium to long term. Their liquidity provides an efficient method for investors and traders to take the risk out of volatile cryptos and temporarily hedge/hold their wealth in a stable safe haven. This hedging technique provides a good opportunity for investors and traders to reduce exposure to the greater cryptocurrency market, which has been shown to fluctuate wildly.

Who? Mostly used by traders and investors to reduce exposure in cryptocurrency markets.

Examples: Tether (USDT), TrueUSD (TUSD), Paxos Standard Token (PAX), USD Coin (USDC), Gemini Dollar (GUSD).

Opportunity: The market for this use-case is fairly saturated and has established entry-barriers. However, all stablecoins catering to this use-case have slow or complex issuance and redemption models. Fiat and commodity backed stablecoins run into liquidity issues when issuance and redemption happen too fast, whereas crypto-backed stablecoins have much more complex issuance/redemption mechanisms that rely on over-collateralisation. The implications of this are twofold. Firstly, mainstream cryptocurrency users have to buy and sell stablecoins through a secondary exchange, which usually command a higher fee than primary issuance. Secondly, it restricts the creation of new stablecoins, thus limiting stablecoin growth. This leaves a niche for a stablecoin that has an issuance and redemption model flexible enough to address the requirements of crypto users.

Exploit Crypto Exchange to Exchange Arbitrage Opportunities

What? With cryptocurrency trading still in its infancy, there are some significant price discrepancies between exchanges and issuance platforms. Stablecoin trading pairs are popular because of their low volatility, allowing traders to exploit arbitrage profits without experiencing high volatility risks. Secondly, when an asset backed stablecoin breaks its peg, arbitrageurs are able to redeem or issue more stablecoins directly from the stablecoin issuer, while simultaneously selling or buying them on an exchange.

Who? Arbitrageur traders in the cryptocurrency market space.

Examples: Nollar (unimplemented).

Opportunity: Most stablecoins have relatively slow transaction speeds due to their blockchain, and/or slow and complex issuance and redemption models. This makes it harder to exploit an arbitrage opportunity as it takes time to move the token from one exchange to another, making it subject to price fluctuation. This represents a niche market for a stablecoin with faster transaction speeds than the Ethereum platform can offer and/or a fast issuance/redemption model.

Store of Value for Crypto Investment Firms

What? Current fund holdings for crypto investment firms are mostly denominated in Bitcoin and Ether, which represents a risky exposure to the volatility of the cryptocurrency market. With the increase in safety of stablecoins and the growth of security token offerings (STOs), investment firms seek to use stablecoins as a store of value for their cryptofunds.

Who? Crypto investors, which includes crytofunds, crypto exchanges, broker-dealers, and value-added service providers with crypto as the main store of value. In 4Q2018, Tether re-opened its direct redemption of fiat options. The minimum redemption amount is US$100K suggesting that they are positioning USDT mainly as a store of value for investment funds.

Examples: Tether (USDT), TrueUSD (TUSD), Paxos Standard Token (PAX), USD Coin (USDC), Gemini Dollar (GUSD).

Opportunity: With many crypto investors gearing up for the wave of security token offerings, there is a significant pool of investment money that will seek to be stored in stablecoins. This market is already fairly saturated, with big players like Tether well positioned to capture the market. The security token market is projected to grow to US$5T by the end of 2020. The majority of the funding will come from STO investment funds. These funds will look to land on a stable crypto before making an actual investment in security tokens.

Physical World Application

Reduce the Cost of Remittance in Countries

What? Most current remittance transactions - which are essentially just a transfer of money by a foreign worker to an individual in their home country - are executed using the SWIFT system. When money is sent through the SWIFT system, it is bounced around multiple intermediaries each taking their cut and increasing the time it takes to complete the transaction. On average the charge for sending $200 - the benchmark used by authorities to evaluate cost - is $14 (7%). Additionally, transferring money between some countries can take on average between 3-5 days.

Who? Foreign workers from developing countries. According to the World Bank, in 2018 overall global remittance was US$689B of which 76.6% was sent to developing nations, with India being the top receiver, receiving US$80B (11.6%). Following India is China (9.7%), Philippines and Mexico (4.9% each) and Egypt (3.8%).

Examples: Nollar (unimplemented), Facebook/WhatsApp stablecoin (unimplemented).

Opportunity: A stablecoin system can replace the SWIFT system. The stablecoin can streamline the remittance process, by eliminating all of the middlemen while still ensuring safe transactions. There are two ways a stable coin can be manufactured for this use-case:

1) If the stablecoin is widely accepted in a country, then all remittances in that country can be done in stablecoins.

2) An alternative option, would be to have two stablecoin pairs, one backed by the sender's currency, the other backed by the receiver's local currency. The sender will have to convert the foreign currency into the stablecoin, then the stablecoin can be sent to the receiver's wallet. The receiver must then convert the stablecoin into their local currency.

Improve International Trade

Most international trade is conducted in USD. Europe pays 80% of its energy import bill in USD and yet only 2% of its energy is imported from the US. This means that a substantial portion of a country's reserve is denominated in USD, this leads to the Triffin's Paradox. One way around this is for international trade to be completed using a currency basket. Currency baskets are weighted portfolios of selected fiat currencies. Currency baskets diversify currency risk, making it more stable than a fiat currency. The three most notable currency baskets are: the European currency unit, this was the precursor to the Euro; the IMF SDR, which serves as a unit of account for the central banks; and the Chinese Yuan, which is planned to be used as a medium of exchange for international trade between Chinese trading partners.

Building a currency basket has a number of barriers:

- Size: The foreign exchange market is structured for large investments.

- Price: Difficulty in getting a good price for buying and selling the currency pairs in the currency basket.
- Infrastructure: Due to the complexity of efficiently trading in the foreign exchange market, there is a high requirement for resources to be put aside.

Who? International trade participants. A total of US$32T is exported/imported every year.

Opportunity: Smart contracts and tokenisation of the currency basket make the ability to trade a unit of value of the currency basket much easier. There are currently no live currency basket stablecoins, leaving this market open for a new value proposition. A currency basket stablecoin can be used as a medium of exchange for international trade, however, there will be a major adoption challenge to make the currency basket stablecoin the solution. For example, in 2009, the IMF SDR had a market cap of US$20B, however, this still wasn't enough for the IMF SDR to be actively used in trading.

Reduce Currency Conversion Rates

What? Currency conversion fees can be quite high. For example, PayPal charges New Zealand customers 3.4% as a currency conversion fee if you buy something denominated in a different currency using their system. Visa and Mastercard charge around 2-3% as a currency conversion fee. In April 2016, the Forex market averaged $US5.09T per day.

Who? Foreign workers, international trade participants.

Examples: SagaCoin (SAGA), Globcoin (GCP).

Opportunity: A foreign currency account has the potential to reduce high currency conversion fees. However, the minimum deposit into many foreign currencies is around US$10K, which makes foreign currency accounts inaccessible to retail consumers. Globcoin is a multicurrency backed stablecoin designed to be a multicurrency bank account, which offers its customers a zero Forex markup. Alternatively, setting up a network of stable currencies each backed by a different currency could be a cheaper alternative to the SWIFT system.

Improving Online Retail

What? A stablecoin can improve online retail by virtually eliminating chargeback risks for online vendors, and by providing a stable price for consumers. A chargeback is a reversal of a prior outbound transfer of funds from a consumer's bank account, line of credit, or credit card. Stablecoins use a consensus algorithm that ensures that consumers have the funds in their wallet, thus eliminating the chargeback risk for online vendors. Online retail prices are set to fluctuate depending on the forex rates, these price changes can make it more expensive for consumers in one country to buy international goods.

Who? E-commerce platforms and online retailers. In 2017, e-retail accounted for $US2.3T.

Examples: Terra (unimplemented).

Opportunity: The opportunity lies in setting up the blockchain-based payment infrastructure for online retail (i.e. Stripe for cryptocurrencies) and building e-retail ecosystem partners (e.g. Amazon, Ebay, Alibaba, etc.) for the use of a stablecoin.

Reduce Inflation in Developing Countries

What? Developing countries face elevated levels of inflation, leading to massive losses in purchasing power for both businesses and individuals. Additionally, developing countries have ineffective and at times corrupt banking systems. Millions of people in Africa and Asia do not have access to a bank account. Increasingly, they have smartphones so mobile banking is one possible solution. However, this also poses challenges as telecommunication providers charge up to a 20% premium, and many low-income people lack the documents required to open a bank account. A stablecoin and crypto wallet system has the potential to solve both problems at once.

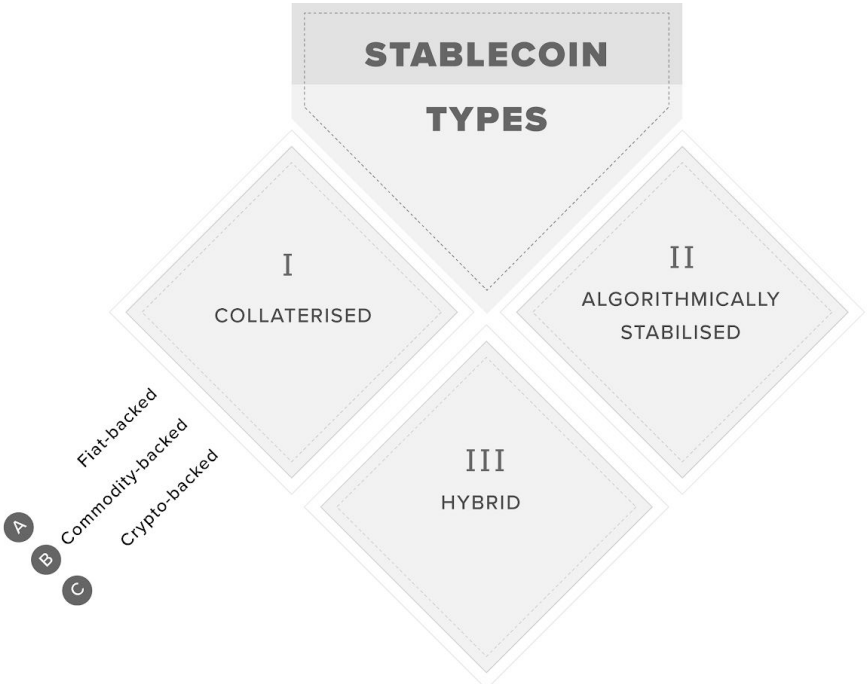
Who? Stablecoins can be used by developing nations to address the issue of their local currencies being subjected to hyperinflation (e.g. Egypt - 32%, Argentina - 23%, Nigeria - 16%, and Venezuela - 741% inflation per annum).

Examples: Brazil Bank Stablecoin, Petro (Venezuelan stablecoin).

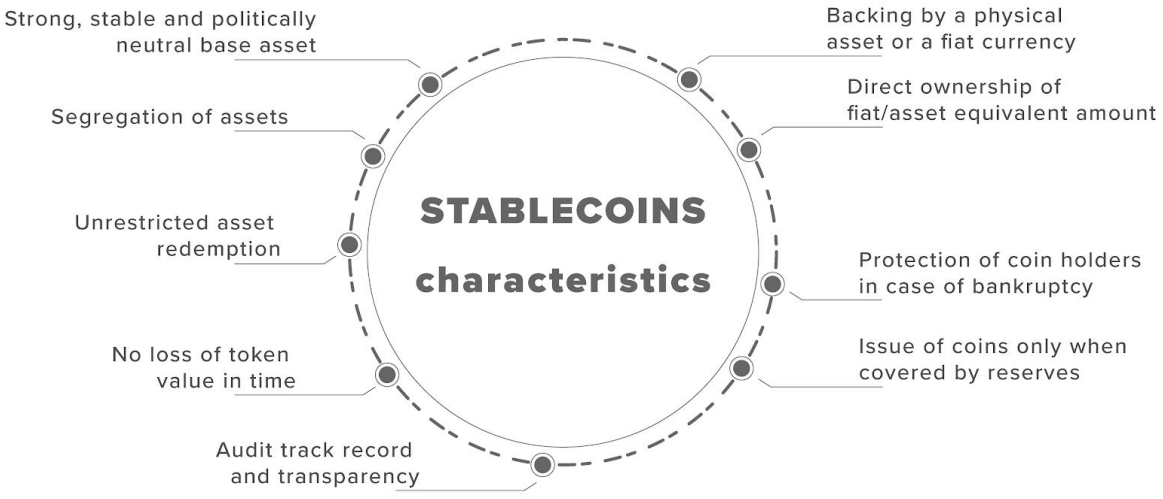
Opportunity: Developing countries are wary of the influence global powers have over their local economies. This means they are more open to testing blockchain-based banking solutions, especially if it includes the potential to avoid economic sanctions, which are currently executed via the SWIFT system.

Stablecoin Mechanics: How Do They Work?

Techemy identified three major types of stablecoin architectures:



For a cryptocurrency to be considered as a stablecoin, some of the following characteristics have to be present:



Type I: Collateralised Stablecoins

A collateralised stablecoin is one that derives its stability from an underlying asset. There are three subcategories of collateralised stablecoins: fiat-backed, commodity-backed, and crypto-backed.

A: Fiat-Backed Stablecoins

Fiat-backed stablecoins are is most widely used type of stablecoins, primarily because of their simplicity. The fiat-backed stablecoin model has two parts: issuance and redemption. In the issuance part, users can buy a unit of stablecoin from the system by paying one unit of a fiat currency; this unit of fiat currency is then stored on a custodial account. In the redemption part, users can liquidate their unit of stablecoin by selling it back to the system for a unit of fiat currency; the fiat currency comes from the custodial account.

In late 2017, a number of media articles circulated, speculating that fiat-backed stablecoins, specifically Tether[1], could have been issued without the physical collateral. Even though there was no direct evidence for any wrongdoing, it created a prerequisite for fiat-backed stablecoins to be more transparent and engaged with their token holders. Hypothetically, uncollateralised issuance may happen in the following scenario:

- There is a shortage of stablecoins on a secondary crypto exchange.
- The crypto exchange communicates this to the stablecoin issuer.
- The stablecoin issuer may mint more stablecoins to address the scarcity without receiving any fiat currency collateral straight away. This may occur either due to time discrepancies of wiring the fiat currency - the velocity of crypto is significantly higher than that of fiat; or due to the exchange not having enough cash to pay the issuer upfront.
- As a result, the stablecoin's overall market cap increases, being temporarily larger than the underlying collateral.
- Once the exchange settles the bill, the issuer receives the owed fiat currency collateral, reestablishing the 1:1 collateral ratio.

Flaws. The biggest downside of fiat-backed stablecoins is the reliance on the custodial account. In 2018, Paxos and Gemini overcame this problem by getting NYDFS (New York Department of Financial Services) regulatory approval on their stablecoin, while TrueUSD and USDCoin got their regulation from FinCEN (Financial Crimes Enforcement Network). With the uncertainty around Tether's audit of its custody of USD, the four aforementioned stablecoins have gained greater brand recognition and market share. The downside to regulations is that stablecoin issuers must be able to freeze the funds of the account holder, and this is against the ethos of decentralised currencies.

Another flaw with fiat-backed stablecoins is that if the issuance and redemption processes happen too quickly, the system may run into logistical issues with their custodians. The implication of this is that only large denominations of stablecoins are issued or redeemed from the bigger stablecoin issuers. For example, in the case of Tether, the minimum issuance/redemption amount is equivalent to US$100,000 meaning that retail investors are

[1] Markovich, S (2017, December 5). *Commentary: The Overlooked Actor That Could Crash Bitcoin*. Retrieved from http://fortune.com.

restricted to buying and selling Tether through secondary crypto exchanges. New stablecoins such as Nollar are actively working on a solution; however, there's still an unoccupied market niche for such solutions.

Value flow. Value flows into the system when collateral is exchanged in return for the stablecoin. Value will flow out of the system when stablecoin users want to redeem their stablecoins for the underlying collateral asset.

Revenue model. The typical revenue model consists of issuance and/or redemption fees. This fee covers all costs associated with managing the collateral in the custodial account, including, but not limited to storage, transport, audit and compliance, etc. For example, Tether charges between 1-3% fee to redeem USD depending on the amount of Tether redeemed per month.

B: Commodity-Backed Stablecoins

Commodity-backed stablecoins are analogous to fiat-backed stablecoins, except these stablecoins are pegged to an exchange-traded commodity such as gold, for instance. The issuance and redemption model works the same way as in a fiat-backed stablecoin, albeit the collateral stored on a custodial account is a unit of the underlying commodity rather than a fiat currency. The upside of commodity-backed stablecoins is that they can sometimes be a better long-term store of value than fiat-backed ones. Commodity-backed stablecoins are much less popular than fiat-backed stablecoins. This likely comes down to market preferences, the average crypto investor would rather redeem a fiat currency than a commodity such as gold.

Flaws. Commodity-backed stablecoins face the same issue as fiat-backed stablecoins - the reliance on a centralised custodial account. These stablecoins typically have even slower issuance and redemption processes due to the logistics of transporting commodities. Additionally, there are warehousing fees associated with the custody of the commodity, although this is offset by there being no inflation on commodities.

Value flow. Value flows into the system when collateral is exchanged in return for the stablecoin. Value flows out of the system when a stablecoin user wants to redeem his stablecoin for the underlying collateral asset.

Revenue model. The typical revenue model consists of issuance and/or redemption fees of the stablecoin as well as a warehousing fee that is dependent on the time the stablecoin was owned for. These fees are used to cover the costs to manage the collateral on the custodial account, including, but not limited to storage, transport, audit and compliance. For example, Tiberius coin charges a 2% warehousing fee and a minimum of US$10 to redeem the commodity collateral in exchange for the stablecoin.

C: Crypto-Backed Stablecoins

Crypto-collateralised currencies attempt to solve the two issues fiat-backed cryptocurrencies face:

1) Reliance on a centralised custodial account, and

2) The slow issuance and redemption transaction speeds resulting from a fiat-backed stablecoin model featuring a decentralised issuance and redemption mechanism.

Analogous to fiat-backed stablecoins, crypto-backed stablecoins usually are pegged to a fiat currency, however, it uses other cryptocurrencies as collateral. Due to the highly volatile nature of cryptocurrencies, one cannot simply have a constant collateral ratio backing the crypto-backed stablecoin. A stablecoin is issued by depositing the crypto-collateral (usually Ether or Bitcoin) into a smart contract called Collateralised Debt Position (CDP). The CDP then states the ratio of crypto-value to fiat-value. For example, if a CDP was set to 500%, users will have to deposit say $5 worth of Bitcoin into the system and get up to $1 worth of the stablecoin. When users want to retrieve their collateral, they pay the CDP smart contract in stablecoins plus any additional network fees.

The incentive for users to buy a CDP smart contract is that it creates an opportunity for crypto-traders to leverage margin trade. Going back to the Bitcoin example, when users take up the CDP smart contract, they lock away $5 of Bitcoin, but get $1 worth of stablecoin that they can sell on an exchange to buy $1 more of Bitcoin. As a result, the user is now long on $6 worth of Bitcoin with only $5 worth of initial investment. If the price of Bitcoin appreciates relative to the stablecoin (which is pegged to a fiat currency), the users would have effectively magnified their gains on Bitcoin by 20%.

The incentive to take up CDP smart contracts when Bitcoin is in a bear market is that users are compensated with the network fees collected by the system. The network fee is adjusted to reflect the risk in going long in the cryptomarkets: when the cryptomarket is bearish, the network fee increases since taking CDP contracts become risky. Conversely, when the market is bullish, the network fee reduces since the CDP contracts are less risky.

Price stability of crypto-backed stablecoins is based on the incentive to create the stablecoin - if the price falls, then the CDP ratio increases, making it more expensive to create the stablecoin, thus lowering supply. Conversely, if the price increases, the CDP ratio decreases, making it cheaper to create new stablecoins, thus increasing the supply and reducing the price of the stablecoin.

Flaws. Since cryptocurrencies are more volatile than the pegged fiat currency, the CDP ratio must be greater than 1. This makes the process very capital intensive. Secondly, since these coins are pegged to a fiat currency but the collateral to back the peg is denominated in highly volatile cryptocurrency, there is a possibility of the price stability mechanism not working fast enough in volatile cryptocurrency market movements, hence leading to a “run on the bank” situation. To mitigate some of these flaws, it is sensible to have an emergency protocol that would allow a global liquidation at any particular point in time, so if there were a black swan event all stablecoin owners would be paid out evenly.

Value flow. Value flows into the system when a new CDP smart contract is created by the system and sold to a user. Whereas value flows out of the system when the user wants to liquidate his CDP smart contract, settling the contract by paying the stablecoin. Additionally, there is a network fee that is payable by anyone who withdraws a stablecoin from the smart contract. This fee is used to pay users for taking up risky CDP smart contracts.

Revenue model. In the MakerDao ecosystem, the network fee is known as the stability fee and it fluctuates between 0.5-2.5% per annum depending on the cryptomarket conditions.

Type II: Algorithmically Stabilised Stablecoins

The algorithmic stablecoin is based on monetary policy and "game theory" to establish price stability. Monetary policy is a core function of central banks to control the money supply of fiat currencies. The idea behind monetary policy is to increase the supply of money to cause inflation and hence depreciate the value of the fiat currency. Conversely, a decrease in the supply of money will lead to appreciation of the value of the fiat currency. Although there are many token economy models where token supply can be altered, there are no workable models available. To date, the only model that comes close to be being implementable is *seigniorage shares*. Seigniorage is the difference between the money value and the cost to produce it. If seigniorage is positive, then economic profit is realised; the opposite is true.

In a typical seigniorage share stablecoin model, there are three types of tokens: *genesis tokens*, *stablecoins,* and *bond tokens*. Genesis tokens are created at the initiation of the platform and are used as a fundraising vehicle for early investors. These tokens pay dividends in the form of a stablecoin whenever the stablecoin is trading higher than its peg. This should increase the supply of the stablecoin, thus depreciating its value. When the price of the stablecoin falls below its peg, then the system will auction out bond tokens, which sell for less than one stablecoin; the system will pay bond token holders one stablecoin when the value of the stablecoin is back to its peg. There is an expiry date on the bond, meaning that if the stablecoin doesn't reach the peg before the bond tokens expire, the system will default on the debt. The base tokens also pay back on FIFO basis (First-In, First-Out).

Flaws. The algorithmic stablecoin is deemed as a security as it is seen as a hedge against the crypto market, as well as their ability to bear interest. In December 2018, Basis, one of the most well-funded algorithmic stablecoin startups, confirmed that it is shutting down due to regulatory pressures. Furthermore, the price stability algorithm relies on issuing debt that matures when the stablecoin is traded at its peg. Therefore, when there are lots of bond tokens issued, there will be a price ceiling at the peg's value, which will increase the supply of the stablecoin, thus putting downward price pressure on the stablecoin. Speculators will want to take advantage of this price ceiling by immediately shorting the stablecoin at its peg, causing further downward price pressure and resulting in even more debt being issued. Thirdly, a "run on the bank" situation is very possible: once there is a significant movement below the peg, market players will en masse want to liquidate their stablecoins instead of purchasing bond tokens, which will lead to the failure of the stablecoin.

Value flow. The first value flow commences during the ICO/STO to raise initial liquidity base, the ICO/STO investors get genesis tokens. Genesis tokens are complex securities that pay dividends in stablecoins whenever the price of the stablecoin is trading above the peg. Hence, genesis tokens can be seen as a weak hedge against the general cryptocurrency market. The reason for that is when the cryptocurrency market is bearish, there is an increase in demand for stablecoins, which results in the stablecoin trading above its peg. Base bonds are another complex security, being essentially zero coupon bonds without a fixed maturity date. The price of the base bond is correlated to the health of the stablecoin ecosystem - if a stablecoin ecosystem is "healthy", the base bond price will be relatively higher than if the stablecoin ecosystem was "unhealthy".

Revenue model. The system is fully decentralised and not owned by any organisation, stablecoin participants can generate revenue by buying bond tokens and redeeming them at maturity. Founders and early investors can extract revenue from the payoffs from genesis shares.

Type III: Hybrid Stablecoins

A hybrid stablecoin is a loose term that describes a stablecoin structure that has elements of both Type-I (collateralised) and Type-II (algorithmically stabilised) stablecoins. An example of a hybrid stablecoin system would feature a reserve ratio, which is the percentage of the stablecoin market cap backed by an underlying stable asset. At initiation, the reserve ratio will be 100%, ensuring a price stable stablecoin much like a Type-I stablecoin. As the economy grows, this ratio will decrease. Eventually, when the economy is big enough, the ratio will be reduced to 10%, and the stablecoin will operate as an algorithmic stablecoin.

The advantage of hybrid stablecoins is that they reduce both the "run on the bank" risk and the need to have a reserve, which can be particularly problematic as the market cap of a cryptocurrency grows.

Flaws. The hybrid stablecoin aims to minimise the issues faced by Type-I and Type-II stablecoins. Type-II stablecoins are subject to market risks, such as speculative attacks, especially when they have a small market cap, making Type-II stablecoins more suitable when the stablecoin market matures. Type-I stablecoins are capital intensive and charge fees to redeem and issue stablecoins, but the potential for speculative attacks is low. The hybrid stablecoins attempts to adapt its price stability mechanism from a collateralised stablecoin to a algorithmically stabilised stablecoin depending on the market size of a coin.

Value flow. Much like a collateralised stablecoin, value flows into the system when collateral is exchanged in return for the stablecoin. Value flows out of the system when the stablecoin user wants to redeem their stablecoin for the underlying collateral asset. Secondly, the value can also flow in when the token bonds and genesis shares pay-out the same as in algorithmically stabilised stablecoins.

Revenue model. The revenue model consists of charging a fee to issue and redeem the new stablecoin. This fee covers all costs to manage the collateral on a custodial account, including, but not limited to storage, transport, audit and compliance. Secondly, the revenue can be generated by issuing either genesis tokens, bond tokens, or both.

Stablecoins vs. Financial Securities

Whether a stablecoin can be considered a "financial security" depends upon the laws of the jurisdiction in which it is used. For example, in the US, whether a financial product should be classified as a security depends on the following conditions being met: it is an investment of money, there is an expectation of profits, the investment is in a common enterprise, and the

profit is derived from the efforts of a third party (Howey test). The line where a token becomes a security can be ambiguous.

One of the most prominent examples include **Basis** token, where the creators argued that the token was not a security due to its distributed nature. Nonetheless, the SEC ended up classifying it as a security, most likely because there was still a central team and the network had not been launched yet. A similar scenario occurred with Ethereum, where the SEC stated that at launch Ethereum would have been considered a security, but due to the fact that the SEC only took an interest in Ethereum after the project had been decentralised, it did not fall into the securities category as there was no single "promoter or third party" to satisfy the last condition of the US Howey test.

Collateralised stablecoins might be deemed a security. For example, **SwissRealCoin** is backed by a portfolio of Swiss commercial real estate, which automatically makes it a security in most jurisdictions.

Techemy believes the next new growth for stablecoins will derive from the security token ecosystem. Security tokens will bring regulation and trust into the crypto community, and stablecoins will continue serving as a short-term store of value in the security token ecosystem. However, the challenge for stablecoin issuers will be the interoperability with the different security token frameworks. With the introduction of security tokens, there emerge new asset types that can be tokenised and used as a stablecoin:

- **Tokenised stable assets**: With the advent of security token exchanges, companies will be able to choose to list parts of their company on these exchanges in a form of security tokens (e.g. tokenised stocks, commodities, and bonds). These security tokens might serve as an alternative option to stablecoins for cryptocurrency traders looking to reduce their risk in the cryptomarket;

- **Tokenised government debt:** Governments will be able to issue tokenised debt on security token exchanges (e.g. tokenised US treasury bonds). These security tokens may serve as an alternative option to stablecoins as well.

Stablecoin Market Overview

Current Market Size of Stablecoins

The 'market size' of stablecoins is a difficult metric to assess. For example, collateralised stablecoin ecosystems could be considered twice the size of the supply of digital tokens because of the 1:1 matching of fiat dollars. So, the Tether ecosystem could be considered worth double its current market cap because each USDT is backed 1-for-1 with physical USD, with the Tether.to group having relative freedom to manage their holdings of physical USD by, for example, reinvesting them in assets that offer a stable yield, like treasury bonds.

The size of over-collateralised stablecoin systems is even more complicated to assess. Stablecoins like DAI and BitUSD work using smart contracts that specify a collateral ratio,

which needs to be maintained. So, for example, a smart contract that generates 50 DAI may require the holder to maintain a ratio of 2:1 collateral to DAI, so collateral worth at least US$100. This leads to a flaw in the design of over-collateralised stablecoins - they will always have a supply ceiling and they can tie up more USD than they represent.

For the purpose of simplicity, market cap of stablecoins in this report is based on the total token supply value, not on the value of their backing/collateral. This allows the adoption of these coins to be measured with a common metric even with different stablecoin models.

The total market cap for stablecoins currently sits at just under US$3B, with approximately 70% of the total coming from the market cap of Tether, which currently has a total supply in the equivalent of US$2.05B. Although Tether can be seen as a clear dominator in the stablecoin space (based on the market cap), the crypto environment has proven that change can happen fast. This is evident in the adoption of new stablecoins over the 4Q2018-1Q2019 period, discussed below.

Growth and Adoption of Stablecoins

Tether has been around for years, being the only effective option for a while. Since September 2018, when the market was worth US$2.9B, comprising of US$2.8B worth of Tether, a lot has changed. After accusations of not being fully collateralised, Tether fell to lows of US$1.7B in November 2018, which, in turn, gave an opportunity for new audited stablecoins to emerge. As shown in the "Market Cap Ranking" table below, both USDCoin and TrueUSD have gained a lot of traction by providing their more "transparent" solutions.

The stablecoin market has since recovered and is now worth circa US$2.9B, but with a greater composition of other coins. Tether has started gaining back trust after efforts to be more transparent, providing a snapshot of their bank balance.

Coin	**Market Cap Ranking** (in US$ as against all crypto)					
	Sep'18		**Nov'18**		**Jan'19**	
	M.Cap	***Rank***	***M.Cap***	***Rank***	***M.Cap***	***Rank***
Tether	2.8B	8th	1.7B	8th	2.0B	6th
TrueUSD	86M	70th	161M	43rd	211M	26th
Paxos	-	-	136M	51st	142M	37th
USDC	-	-	144M	48th	327M	20th
GUSD	-	-	25M	164th	93M	52nd
DAI	52M	100th	77M	68th	73M	58th
BitUSD	11M	308th	10M	319th	4M	387th

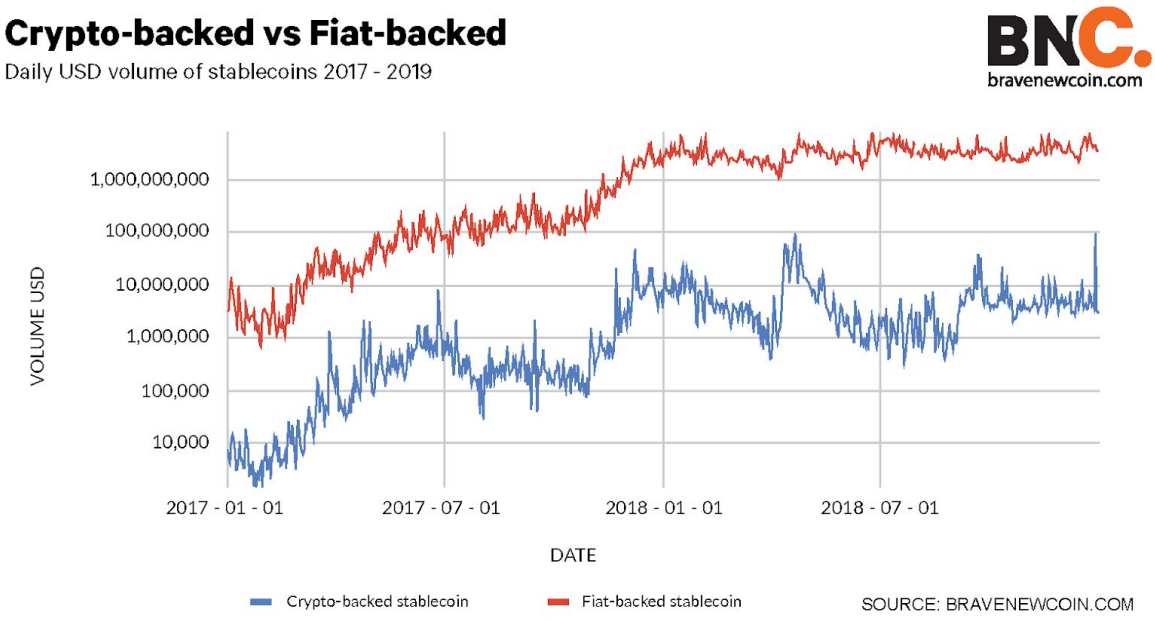
Source: CoinMarketCap.

While the crypto market remains bearish, the stablecoin market continues to grow. Tether is listed on 50+ exchanges, and other stablecoins are slowly getting more exchange listings, and are currently available across all major exchanges. Total trading volume is dominated by Tether, averaging 3-7B USDT daily, compared to all other stable coins collectively having a trading volume between US$100-500M, DAI being the next highest by daily trading volume occasionally touching a US$100M in a day (Source: BraveNewCoin).

Exchange-Traded Volumes

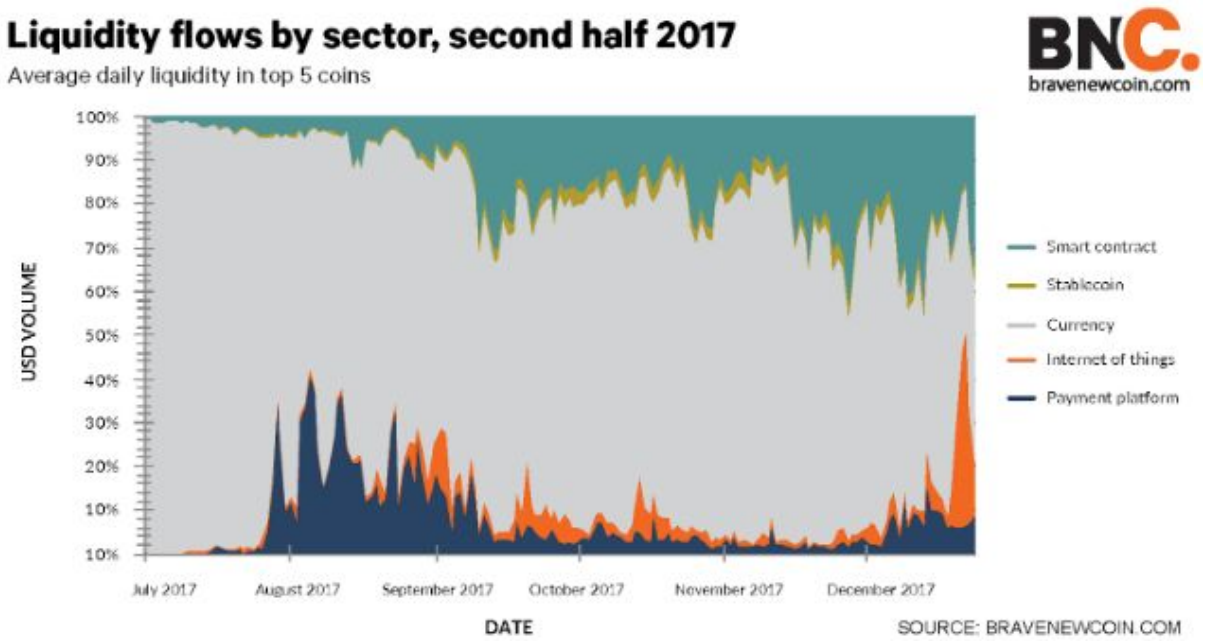
The market cap dominance of Tether has been challenged by decentralised (crypto-backed) and more “transparent” stablecoins, dropping from circa 90% market share in September 2018 to around 65% in February 2019, with a greater representation of other stablecoins that are gaining popularity such as DAI, TrueUSD, and USDCoin.

The chart below shows how both fiat-backed (USDT, TUSD, PAX, USDC) and crypto-backed USD stablecoin (DAI, BitUSD, SUSD) exchange-traded volumes have gained much ground over the past two years - particularly impressive considering most of the crypto-backed growth was driven solely by DAI.

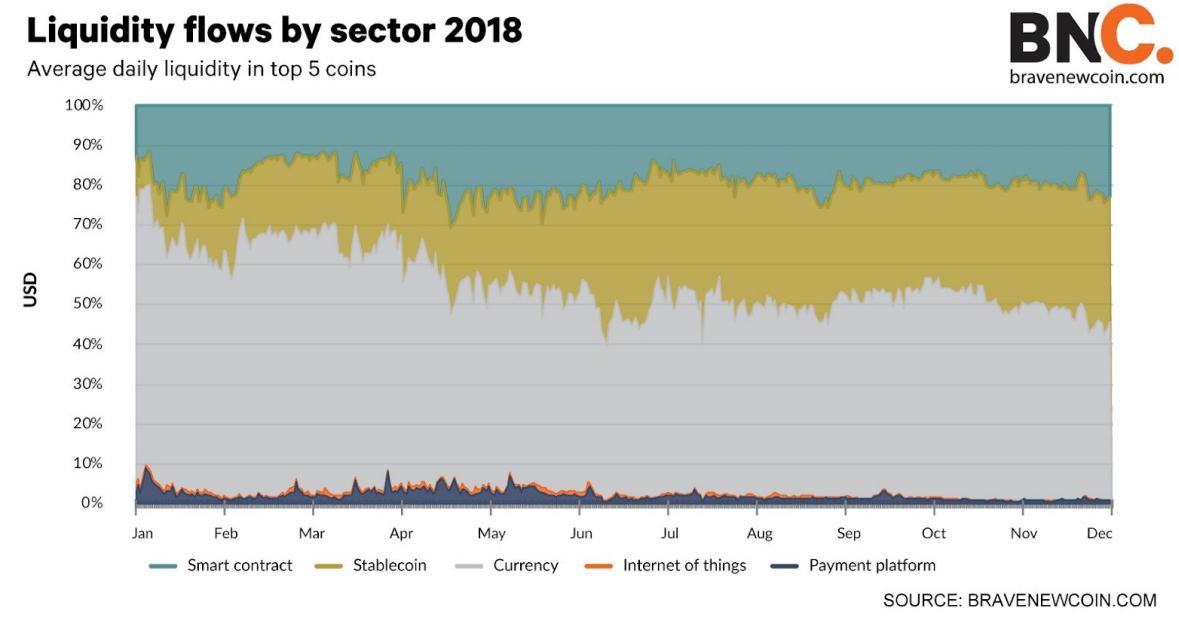


While fiat-backed coins currently dominate the trading on centralised exchanges we expect to see the decentralised sector grow significantly both in terms of on-chain and on-exchange transactions as their utility and functionality is fully realised in decentralized applications and decentralized exchanges. We can already see the nascent stages of this with the emerging decentralised finance markets (DeFi) and the many innovative Dapps built on top of the Maker DAO ecosystem, enabled by the decentralised debt contracts which create DAI.

As late as the second half of 2017, the stablecoin sector was a slither of overall crypto market liquidity compared to other major cryptographic asset sectors, as displayed in the below graph. The hype around certain sectors was fuelled with buzzwords becoming mainstream. This can clearly be seen when the media pushed certain phrases such as “Internet of Things” towards the end of 2017, the related coins rocketed in popularity, temporarily enhancing liquidity fivefold (refer to the graph below).



However, as soon as the bear market manifested itself in early 2018, the stablecoin market exploded in number and volume as traders and investors looked for a hedge against volatility (refer to the graph below). Payment, platform, and other tokens plummeted and the stablecoin sector was soon as big as the smart contract sector, which includes crypto heavyweights such as Ethereum, EOS, and Neo. The sector has also encroached on the turf of traditional cryptocurrencies, such as Bitcoin and Ripple XRP, as the variety of USD coins gave traders more options and a more familiar quote currency to trade crypto against (previously the market was dominated by crypto-to-crypto pairs).



10 Largest Stablecoins

Stablecoins play their part in the evolution of the cryptocurrency space, enabling investors to operate with crypto while reducing volatility risks. However, there is no one typical profile of what a stablecoin project looks like, with all of them reflecting the vision embodied into them by the founding team. The tables below provide a comparative snapshot of the top 10 leading stablecoins as of February 2019. As stabilisation mechanisms and balance of collateralised assets are still being worked out, there is still an opportunity for a fully decentralised, distributed, immutable and censorship resistant form of currency.

Fundamentals of Top 10 Stablecoins					
Coin	**Established**	**HQ**	**Decentralisation**	**Price Stability**	**Public Perception**
Tether	2014	HK	Low	Very High	Med
TrueUSD	2018	USA	Low	High	High
Paxos Standard	2018	USA	Low	High	Low
USD Coin	2018	USA	Low	High	High
DAI	2017	USA	High	High	High/Med
Gemini Dollar	2018	USA	Low	High	High
Stasis Eurs	2018	Malta	Low	High	Med
Steem Dollars	2016	USA	Med	Med	Low
BitUSD	2014	USA	Med	Low	Low
Digix Gold Token	2018	SG	Med	High	Med

HQ - The United States is currently the leading location for stablecoin development, although most projects have teams scattered across the globe.

Founding Year - In 2018 there was a significant increase in the popularity of stablecoins with 50% of the largest stablecoins being implemented, mainly driven by the bear market conditions.

Decentralisation - The basic criteria for this are issuance, redemption, and transaction confirmation. Tokens score highly if issuance and redemption are automated and do not occur with verification from a third party and do not have backdoor protocols like Gemini dollars. Steem and BitUSD lose points for using Proof-of-Stake consensus to confirm transactions.

Public Perception is based on media and general public coverage of a stablecoin project. Scores are based on positive stories from mainstream media publications and number of search results connecting the stablecoin to negative stories. Additionally, the score is affected by the subscription count on Twitter and Reddit, as well as by qualitative assessments of general feedback from users on social media. For example, Paxos scored 'low' as it has only around 60 subscribers on its subreddit, and due to bad press - there were reports claiming that Paxos was withholding funds from Ether traders trying to redeem PAX stablecoin for US dollars[2]. Similarly, Steem and BitUSD scored low due to the lack of recent media coverage, as well as public research pointing out project flaws - BitUSD's underlying token BTS, for instance, was claimed to have minimal utility outside of acting as collateral for stablecoins[3]. In contrast, such stablecoins as, for example, TrueUSD and USDCoin scored high because of

[2] Madore, P, H (2018, December 30). P*axos Standard Hassling Ethereum Traders Trying to Redeem Stablecoin PAX for Dollars*. Retrieved from https://www.ccn.com.
[3] BitMEX Research (2018, July 21). *A brief history of stablecoins (Part 1).* Retrieved from https://blog.bitmex.com.

their pristine public image, significant follower-base across social media, and favourable feedback from the mainstream financial media[4].

Technicals of Top Ethereum-Based Stablecoins*							
Coin	Framework	Backed by	Holders	Top 5 Holders**	SC Transfers	Market Cap (US$)	Average 24H Vol (US$)
Tether	ERC20	USD	2,500+	79%	41,000+	2,000M	5,000M
TrueUSD	ERC20	USD	7,500+	56.1%	13,000+	210M	60M
Paxos Standard	ERC20	USD	3,500+	63%	33,000+	120M	67M
USD Coin	ERC20	USD	6,000+	58%	70,000+	262M	29M
DAI	ERC20	Ether	7,500+	64%	195,000+	79M	13M
Gemini Dollar	ERC20	USD	1,000+	83%	17,500+	83M	21M
Statis Eurs	ERC20	Euro	2,300+	91%	38,000+	35M	0.464M
BitUSD	ERC20	BitShares	49+	99.99%	123+	5M	0.118M
Digix Gold Token	ERC20	Gold	900+	50%	13,000+	4M	3M

**Only public ERC-20 based stablecoins are listed because of robust reporting mechanisms and smart contract design (invocation, destruction, creation, transfer, escrow receipts) are all recorded. Note that Tether has both an ERC20 and Omni implementation, but only the ERC20 part is reflected in the table as the data from Omni is difficult to extract.*

***Source: Etherscan.io*

Technical Framework - Ethereum's ERC20 standard remains the most popular standard for smart contracts.

Backing - While a few projects have attempted to come up with alternative models for stabilisation, USD is still the most used peg out of all fiat currencies. Crypto-collateralised models are being actively explored, but market penetration of such projects is low.

Holders and Top 5 Holders - These are indicators of a stablecoin's adoption and market penetration. The more holders there are, the more distributed the stablecoin is. The lower the proportion of the tokens held by the top five holders, the greater the security of the network as highly concentrated stablecoins are subject to "51% security attacks".

Smart Contracts Transfers - This an indicator of movement and utilisation of the token, it represents the quantity of operational requests made to a stablecoin's smart contracts with the purpose of minting and/or burning tokens in order to reflect the issuance/redemption requests. The more transfers there are, the more interacted the stablecoin is.

Market Cap - This is a hard metric representing the size of a stablecoin. Tether dominates the top-10 market with 71% market share, followed by USD Coin with 9%, and TrueUSD with 7%.

Average 24H Volume - This metric allows a more granular view of a stablecoin's daily usage. While this indicator draws a similar picture to the market cap, it makes it easier to spot hidden discrepancies and correlations. For instance, Digix Gold Token's average 24h volume is at the 75% ratio to its market cap, which is quite high as the only other stablecoins that are traded above 50% ratio are Paxos (53%) and Tether (150%). One explanation for this is the fact that Digix is backed by gold, which is perceived as a more solid store of value vehicle, and might be seen as a more efficient trading tool as gold tends to appreciate in value over time as opposed to fiat currencies.

Daily 24H volume can be conceivably higher than market cap as these metrics represent different characteristics. Market cap is a total value of circulating tokens, while 24H volume is

[4] Rapoza, K (2018, June 21). *Fiat-Backed Cryptos Wooing Money Managers And Undercutting Other Stable Coins.* Retrieved from https://forbes.com; Aslam, N (2018, November 21). *This May Be The Time To Buy Cryptos While Blood Is Still In The Streets.* Retrieved from https://forbes.com.

a cumulative value of all token movements. The fact that Tether's 24H volume consistently exceeds its market cap indicates that it is a heavily traded and a highly liquid stablecoin.

Stablecoins Correlation with Other Assets

Examining stablecoins in relation to traditional assets showed little to no correlation (refer to the S&P 500 and Gold related graphs below). This is expected for all assets due to these stablecoins being pegged to a single value, 1 USD, so if they don't diverge from this peg stablecoins should display no correlation. It is interesting to note that Gold vs Stablecoins is generally a slightly positive (very minor, however) correlation. In the same way that gold is seen as a safe haven from the stock market, stablecoins are seen as a safe haven from the cryptocurrency market. While the stock market was showing turmoil towards the end of 2018, so was the cryptocurrency market, and the increase in demand for stablecoins might have caused their value to increase beyond their peg ever so slightly, resulting in this weak display of positive correlation.

S&P 500 vs Stablecoins

Gold vs Stablecoins

Source: CoinMetrics.

However, a clear relationship emerged in the cryptocurrency-to-stablecoin correlations: stablecoins were being used to hedge against market declines. As shown in the graphs below, the relationship peaked around October 2018, reaching a negative correlation nearing 0.5. There was a substantial increase in demand for stablecoins when cryptocurrencies were dropping and this was causing the price of stablecoins to increase (although not substantially because they proved to be resilient and hold their peg).

Ethereum vs Stablecoins

Bitcoin vs Stablecoins

Source: CoinMetrics.

Stablecoin Wars: Winners and Losers

Failed Stablecoins

Fiat Currencies that Didn't Make It

Although there are many variants of stablecoins, historical data is not sufficient to draw valid insights. However, it is useful to look at the performance of traditional currency pegs over the years as they share many of the same attack vectors and function on a similar premise of faith in the economy and governance.

A currency will only hold its value as long as the users have faith and credit in the currency. This is as true for crypto as it is for fiat. If the security of a cryptocurrency such as Bitcoin or Litecoin suffered a "51% attack", trust in its network and ability to remain secure (its main value proposition) would be undermined and the price would suffer dramatically.

The Gold-Backed Illusion. Historically, most currencies were pegged to stable commodities such as gold in order to establish faith and credibility in the currency. However, gold is a scarce resource and therefore limits the central bank from controlling certain economic variables such as credit supply, liquidity, interest rates and money velocity.

Real World Currency Pegs Breaks and Currency Devaluations

INFLATIONARY CRISIS	DEFLATIONARY CRISIS	SPECULATIVE ATTACK
Country's debt is denominated in foreign currency	Country's debt is denominated in foreign currency	Currency traders anticipate currency overvalued relative to economic conditions and short currency
Solution: Printing money out of crisis leads to devaluation of currency that leads to inflation	Solution: Austerity measures and defaults on debt to reduce debt burden leads to slow future growth	Essentially a 'run on a central bank" that precipitates a currency crisis
Capital flight abroad - money taken out of banks & countries	Individual debt burden and defaults rise	George Soros famous attack on GBP
Speculators bet against/short it, creates downward spiral	Doesn't suffer a currency 'crisis' but it does devalue	Government forced to defend currency by breaking peg or selling foreign reserves
Inflation more typical of pegged currencies	Not common of pegged currencies	British Pound peg to Euro Exchange Rate Mechanism (1992).
Deutsche Mark-USD (1923); Chilean Peso-USD (1995); Arg Peso-USD (1993).	British Pound-gold standard peg (1931).	

Typically, governments with monetary systems pegged to gold, commodity, or foreign-currency are forced to have tighter monetary policies to protect the value of their currency than governments with fiat systems. But eventually, the debt contractions in market cycles become so painful that they relent, break the link, and print more money - either abandoning these systems or changing the amount/pricing of the commodity that they will exchange for a unit of money[5].

On several occasions last century, redemption was reneged on holders by nations whose currencies were backed by gold, most notably the UK's pound in the 1930s and the US dollar in 1970, known as the 'Nixon Shock', when excess redemption demand depleted the countries' gold reserves forcing them to abandon the peg.

Gold, or any physically-backed stablecoin would presumably suffer from the same scalability issues as its real world counterparts. As the network grows larger the velocity of its monetary base is restrained by holding the underlying asset, while also grows the redemption and custody liability. If the value of gold rallied in USD terms (in a risk-off period) it could precipitate a run of holders to redeem their USD-pegged stablecoin for gold and leave little in reserve to maintain the peg.

Although most real world currency pegs have failed for one or some of the above reasons, there is one that has endured for longer than most, the Hong Kong Dollar.

Crypto Stablecoins that Didn't Make It

NuBits was a stablecoin solution with two units: shares, representing network ownership with the rights to dividends, and currency, designed to keep its peg by custodians. The NuBits community could vote in custodians, who then would set massive "sell walls" (i.e. a price value with huge market depth to reduce the possibility for the price to increase beyond it) at US$1, which would aim to prevent the value from going above US$1. Shareholders could also vote for an increase/decrease of the total supply. In a case of a supply surplus, its community was incentivised to hold onto coins and earn interest. Thus, NuBits was based on the Seigniorage Shares model. The first peg break happened in June 2016 subsequent to the price spike in Bitcoin: as Bitcoin demand increased substantially, there was a "run on the bank", and Nubits was unable to handle such a sell off, which lasted for several months.

At the end of 2017, Nubits faced a reverse issue - there was a supply shortage as the fall of Bitcoin made speculators seek a safe haven, driving the NuBits market cap to increase multifold (around 1,500% up from US$950K to US$14M). NuBits was not able to mint fast enough as the process is restricted by the community's voting, a time-consuming and rigid process, subject to human error. As a result, the peg broke reaching nearly US$1.50/token. This peg break, however, was temporary, as the community pursued arbitrage opportunities by selling the NuBits and buying them back, as the price fell back to US$1. The peg then remained fairly stable until March 2018, when it collapsed and has not returned since. The March crash was caused by insufficient reserves, with the majority held in BTC, hence when the bear market accelerated, affecting the price of BTC, the value of NuBits reserves evaporated. This time around, the NuBits team was unable to protect the price from even a small dip in demand. As at the beginning of February 2019, NuBits tokens are trading at 99%

[5] Dalio, R (2018). *Template for Understanding Big Debt Crisis*. Bridgewater.

value loss (US$0.04). NuBits is an illustrative example of how important it is to maintain sufficient reserves to synthetically maintain the peg in times of turmoil.

Basis was a well-known and well-funded stablecoin project that maintained its peg algorithmically using monetary theory. Pegged to US$1, Basecoin was proposed to keep a specified price through the issuance of Base-bonds when the price was below the peg, and the issuance of Basecoins to Base shareholders when the price was above the peg. The project raised US$133M and was poised to be a competitor to Tether. The investors were mainly VCs, and included some notable firms such as Bain Capital Ventures, Google Ventures, and Andreessen Horowitz. However, the US SEC determined that Basecoin is classified as a security, thus the project was disbanded and the money returned to investors.

BitUSD, a crypto-backed stablecoin run on the BitShares blockchain, with each BitUSD collateralised with the native BitShares (BTS) token. Essentially, BitUSD is purchased in a similar method to getting a mortgage, where BitUSD is the mortgage and BTS is the collateral, and the smart contracts perform the functions of a bank. When "borrowing" 1 BitUSD, at least US$1.75 worth of BTS needed to be locked away. The "over-collateralisation" was designed to ensure that in times of turmoil each BitUSD was backed by at least US$1 worth of BTS.

However, as the bear market continued to drive the value of BTS down, some of the outstanding loans went down well below the 175% collateralisation requirement, resulting in margin calls[6] to the loan holders. This, in turn, caused the loan holders to use their BitUSD to pay-back their debt, and the market was unable to withstand this waterfall of margin calls, thus reducing collateralisation even further and breaking its USD peg.

Once the course of events reached a critical threshold (i.e. when collateral went lower than 100%), the BitUSD smart contracts activated "Global Settlement" (GS), a protective measure that prevented BitUSD from total collapse. This resulted in the suspension of new collateralised loans, disablement of margin calls, and immediate execution of settlements at a global settlement price.

As of February 2019, BitUSD is trading at US$0.78 and although there is still potential for this stablecoin to revive itself as no new coins can be minted until collateralisation is restored, it is quite unlikely as a stablecoin with a broken peg does not evoke trust and optimism.

[6] When an account value falls below the required minimum value, a request (a margin call) is made to the account holder to deposit additional funds to maintain the minimum margin.

Success Stories

Hong Kong Dollar to USD Peg (1983 - Present)

The Hong Kong Dollar (HKD) had been free-floating prior to pegging to the US Dollar in 1983. A combination of poor monetary policy and speculative attacks due to HK's economic position at the time led to hyperinflation of the Hong Kong Dollar. The value of HKD in relation to the USD moved from HK$5.13 to HK$9.60 between 1981 and 1983.

Facing both a currency panic and nervousness about the soundness of a number of banks, the government announced on 15 October 1983 that the HK Dollar would be pegged to the US Dollar at around HK$7.80 to US$1. The main mechanism maintaining the HKD peg to USD is the state's Exchange Fund, which is mandated to directly and indirectly affect the exchange rate of HKD by buying and selling assets from its HK$4T (US$513B) reserve fund primarily denominated in foreign currency assets, including cash, short-term deposits, government bonds, equities and gold.

The Fund has an 80% asset allocation to bonds and 20% to equities; in currencies it holds 80% in USD, 15% Euro and 5% in Yen. If, for example, HKD declines to the lower bounds of its USD peg the fund will sell its USD to buy HKD back from the open market which strengthens HKD/USD - and do the reverse if HKD rises above its USD peg.

In the same way that the Hong Kong government creates a stable currency (in USD terms) for its national companies to sell and trade internationally, the algorithmic stablecoin project Terra is creating a stable dApp platform for e-commerce applications to use the underlying stablecoin to reach customers globally. However, it proposes to take the peg one step further.

Instead of being pegged to just one reference currency, such as HKD to USD, Terra will issue currencies pegged to USD, EUR, CNY, JPY, GBP, KRW as well as a token pegged to the IMF's Special Drawing Rights, called Terra SDR, and all currencies have access to shared liquidity. This shared liquidity allows for atomic swaps (i.e. instant exchange of tokens without having to trust a third part) between fiat currencies, for example, TerraKRW for TerraUSD.

However, in contrast to stablecoins such as Terra which has algorithmic monetary and fiscal policies, the fiat-currency peg means that Hong Kong is synced with the cycles of the US economy and at the mercy of US monetary policies and interest rates.

Tether: Controversial Crypto-Stablecoin Market Leader

Tether (USDT) is a USD-backed stablecoin, operated and maintained by the Tether foundation. It was launched in 2014 and designed to facilitate the digitisation of traditional currencies as frictionless cross-border transaction payment capable tokens. Tether aims to disrupt traditional fiat currencies with blockchain settlement. The Tether.to group is registered in Taiwan and has a banking relationship with Deltec bank based out of Barbados.

Examination of Tether's daily exchange volume vs daily recorded market cap revealed a troubling scenario, wherein the trading movement of Tether exceeds the total amount in circulation. This phenomenon is driven by arbitrage, and has led to Tether's defining attribute

of quickly adjusting USD price retention to maintain a tight 1:1 peg. If a user on an exchange like Kraken makes a large sell order for USDT, causing the price to drop, the exchange has an incentive to buy this sub-$1 Tether for USD as it is redeemable 1 for 1, thus pushing USDT back towards the peg and maintaining the price integrity of the token. When the price is above $1 USDT the opposite is true, and there is an incentive for exchange to sell. Hence, the mechanism is to buy when the price is below 1 dollar, and sell when it is above, resulting in inflated exchange volumes of Tether moving back and forth.

Although Tether used to have a relationship with partner exchange Bitfinex, which had the authority to issue and redeem USDT for physical dollars, currently Tether foundation is the sole 'central bank' of USDT and coordinates its own liquidity and solvency solutions, fully supporting exchange and individual user demand for USDT. The new dynamic creates new challenges for the Tether foundation. If there is a surge in demand for new Tether from exchanges, there is now no inbuilt liquidity provider, so the Tether foundation is now tasked to develop new supply strategies.

Given the market cap of Tether, the foundation has likely accumulated a sizable reserve of funds through issuance fees. Additionally, there is a possibility that the operators of Tether have used the liquid, physical USD they have received in exchange for the issuance of digital dollars for reinvestment purposes. Thus, It is likely that the physical USD, held by Tether, exceeds the amount of Tether in circulations, which eases the liquidity and solvency concerns.

Advantages of the Tether stablecoin model:

- Price feedback is almost instant - Tether always returns to this steady state as USDT$1 can always be redeemed for US$1;
- Natural incentives for exchanges to buy below and sell above $1 price for Tether - Users know they operate with a deep and closely held peg when holding USDT;
- Initial exchange relationship with Bitfinex eased liquidity requirements on Tether for the first 3 years of its existence.

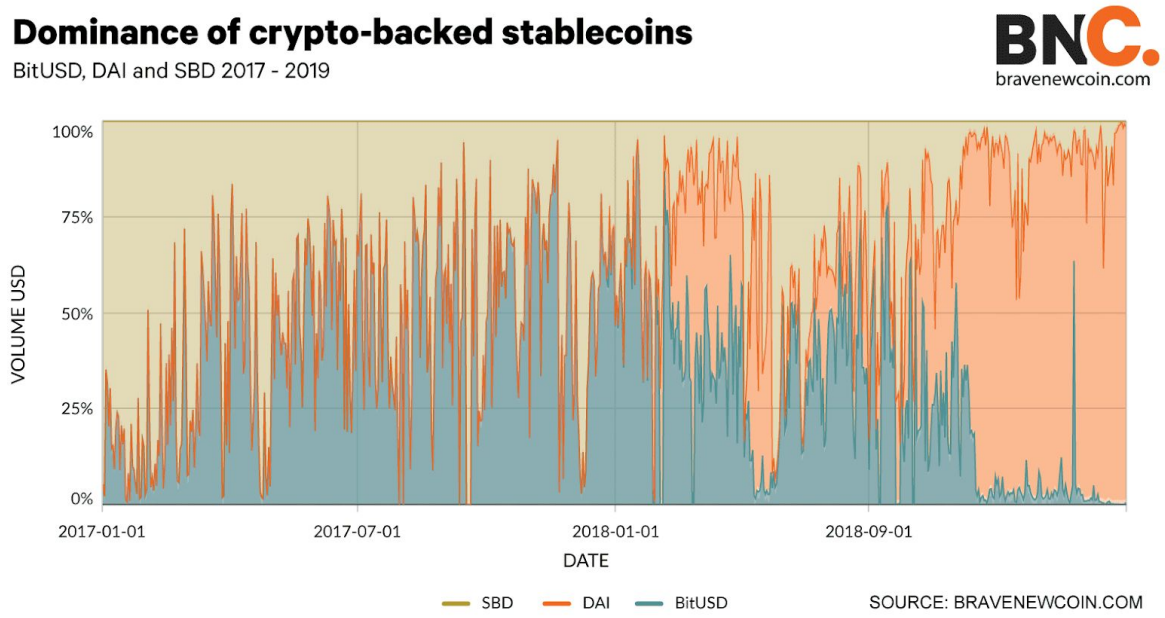
Disadvantages of the Tether stablecoin model:

- Centralised governance - Holders are full subject to counterparty risk, if the underlying Tether.to operation goes under, the tokens will be worth nothing;
- 'Dependent' Monetary Policy - Tether model requires a stable, externally determined USD value and the retention of the USD as world's reserve currency;
- Additional consideration of banking relationships needs to be made - Physical USD reserves have to be checked consistently as there is potential to cause market uncertainty.

DAI: Emerging Crypto-Stablecoin Market Leader

DAI is an over-collateralised crypto-backed stablecoin operated by the Maker, a 'Decentralised Autonomous Organisation' or a DAO. Anyone with collateral assets can create DAI through Maker's CDP (Collateralised Debt Position) smart contract. CDPs create DAI, but generate debt making them inherently risky. Some insights into this stablecoin have already been revealed earlier in this report (refer to the Crypto-Backed Stablecoins section).

The DAI ecosystem only allows Ether as a collateral, but there is a code being created to allow the collateralisation of other crypto assets as well. The current total circulating supply of is 79,593,846 DAI tokens (traded at US$1) is backed by approximately 1.85 million ETH tokens (worth around US$264M as of February 20th 2019). This equates to a total collateralisation ratio of 371%.



Since launching in January 2018, Maker DAI now dominates the exchange volume among the most long-standing decentralised stablecoins, Steem USD and BitUSD. This is testament to its strong dollar peg but also the new utility it brings to the ecosystem beyond trading.

With the price of Ether plummeting significantly over the last 6 months the amount of ETH collateralising the DAI ecosystem has had to increase significantly to ensure a ratio of at least 150% (minimum possible collateralisation ratio) has been maintained through this period.

The DAI model operates with the assumption that the ecosystem participants are willing to take on the risk of becoming an over-collateralised CDP smart contract holder, essentially being a creator of new DAI supply. Therefore, DAI smart contract holders together function like a decentralised central bank.

From the Maker system has emerged a nascent decentralised finance market (DeFi), where DAI creators now have an option to put their DAI to work as loans and earn interest using such landing platforms as Reloanr and Compound.

Another incentive for users to create a CDP is to set up a leveraged long on ETH. A user can create a CDP at a 150% collateral ratio, and lock $100 worth of ETH into the smart contract and receive back $50 worth of DAI. They could then rebuy ETH with the DAI and increase their ETH exposure to $150.

If the price of ETH then doubles, had the user not entered the CDP, they would have $200 but because of the CDP leverage the user's ETH holdings are now worth $300. To close the 'long' a user would put $50 back into the original CDP to close it and be left with an extra $50 of profit that they would not have had if they didn't use the CDP to 'long' ETH.

Competitors to Crypto Stablecoins: IMF SDR and CBDC

SDR's Current Role

The Special Drawing Right (SDR) serves as the unit of account of the International Monetary Fund (IMF) and some other international organisations. It is neither a currency nor a claim on the IMF, but rather a potential claim on the freely usable currencies of IMF's members. SDRs can be exchanged for these currencies.

SDR allocations can play a role in providing liquidity and supplementing member countries' official reserves, as was the case with the 2009 allocations totalling SDR 182.6 billion to IMF members amid the global financial crisis.

SDR's Potential Roles in the Future

A radical redesign of the international monetary system could introduce the SDR as a genuine new currency. The design of such a system would need to consider issuance rules or modalities, including the appropriate balance between rules and discretion, and how elastic supply would be. For example, issuance could be limited to episodes of global stress (improving global liquidity provision). The SDR could alternatively have a broader role as a global risk-free reserve asset so that the issuer's possibly discretionary supply function aims to manage global liquidity beyond acute situations or possibly in trade. The range of users could vary: recipients could be limited to current prescribed holders, expanded to include private systemically important global institutions or platforms, or made universally accessible. To help establish credibility and stability, the currency could potentially be backed by the membership of the institution issuing the currency or by the institution's own assets.

More efficient payment systems and tokenisation introduced by distributed ledger technology may speed up transition to new reserve assets and help kick-start broader adoption of the SDR.

CBDC Plans

Digital currencies issued by central banks (CBDC) might be more trusted and could potentially address some of the shortcomings of private cryptocurrencies by providing a stable link to fiat money. The IMF has made it clear in their research paper that they plan to have Central Bank Digital Currencies issued as domestic currencies. The relationship between a digital SDR and CBDC's would need to be established.

The Future of Stablecoins

Stablecoins are often considered the holy grail of crypto as they utilise the decentralised and secure nature of blockchain and at the same time, offer an escape from crypto market volatility. The influence of stablecoins has grown rapidly, with the strongest drive coming from a need for crypto investors to hedge against volatility. This trend is likely to remain unchanged for the greater part of 2019 and 2020.

There are a variety of stablecoin models being developed, with each new variation aiming to improve upon its predecessors by providing more effective stability mechanisms. Fiat-collateralised stablecoins have emerged as the most popular model with USDT and USDC becoming popular hedges on exchanges. Crypto-collateralised stablecoins are more complex, but offer decentralisation and a method for borrowing and lending in the crypto world.

The most recent iteration are algorithmic stablecoins which remain controversial as evidenced by the SEC's classification of Basis tokens as securities. However, stabilising coin prices by using a smart contract with a shares-for-coins and coins-for-shares system to algorithmically regulate coin supply may have value, as it embraces speculative crypto market participants by dangling potential profits on top of a stable medium of exchange.

Techemy believes the next growth for stablecoins will come from the evolution of the security token ecosystem, which is set to bring regulatory oversight and trust into the crypto community. However, the challenge for stablecoin issuers will lie in their asset's interoperability with the different security token frameworks. With the introduction of security tokens, the market will see an emergence of new crypto assets such as tokenised commodities or tokenised government bonds, which potentially could be used as a peg for stablecoins.

Beyond this, Techemy envisions the following trends to emerge over the 2019-2022 period:

- **Major fiat collateralised stablecoins such as Tether, USDC and TrueUSD will begin adopting retail banking style revenue models**, letting users deposit digital US dollars and earn interest on holdings and providing loan facilities that charge interest. This will spread out revenue beyond redemption and creation fees.
- **More private/semi-private blockchain stablecoins akin to the JP Morgan Coin will be launched as institutions adopt blockchain.** Blockchain transaction models offer a number of engineering advantages vs legacy payment models including seamless, fast cross-border payments. Stablecoins take volatility out of the equation and hosting on a private network means corporate users only deal with trusted parties and transactions remain non-transparent.
- **New index/digital SDR stablecoins like Saga will be launched as they provide a better hedge against uncertainty in the US markets.** Macro factors that may affect the value of the US dollar — such as the US presidential election of 2020 — will encourage the adoption of indexed stablecoins. Single-fiat collateralised stablecoins face the same problems as real-world currency pegs, being at the mercy of central banks that own the underlying peg, whereas digital SDR's offer a better macro hedge.
- **Crypto-collateralised stablecoins such as DAI will be backed by multiple crypto assets**. DAI and projects like it will not just be backed by Ether, but will likely have CDP contracts that are initially capable of supporting ERC-20 tokens like Binance

Coin, that can act as Ether hedges. Then, once interoperability technology becomes more complex, these contracts will also support non-Ethereum tokens.

- **Stablecoins will gain adoption as tools for payment/Point of Sale transactions.** With Liquid's Japanese Yen stablecoin announced and non-bank payments now permitted for remittances of over JPY 1 million, Yen-based digital stablecoin payments may become a reality in the near future. Adoption of stablecoins that offer fluid payment settlement by being hosted on scalable networks like Liquid should follow if the JPY model proves successful.

Crypto stablecoins possess some fundamental characteristics of money that may well be superior to fiat currencies. However, the long-term future for stablecoins depends on their compatibility with real-world applications such as remittance, currency conversion rates, e-retail payments or an inflation hedge in developing countries.

The upcoming tokenisation of financial securities may be the on-ramp that takes stablecoins to next level adoption and utility. Nonetheless, the challenge for new stablecoin projects remains the commercialisation and sustainability of their token economies.

Techemy has broad experience in the development of viable token economies and is available to consult on any stablecoin project.

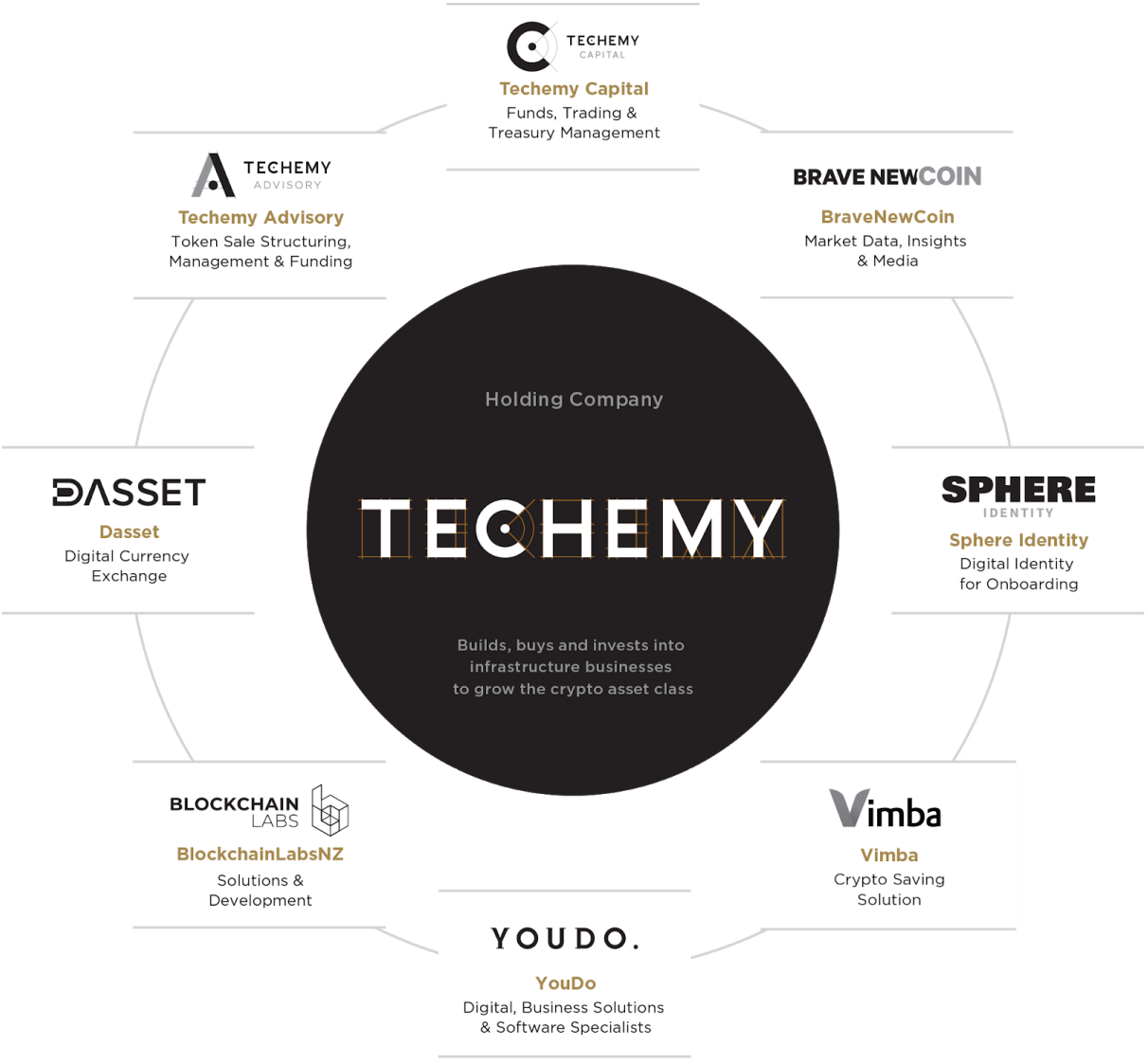
About Techemy Group

Techemy is a venture builder. We have founded, operated, acquired and grown a number of businesses which support our core thesis that a 4th major super-class of assets has arisen.

Techemy takes a mid to long term thematic approach to growth but also recognises that working in an exponential industry requires a company structure fit to meet our objectives in the ever changing landscape.

Techemy provides Financing, Accounting, Governance, Operations, Legal, HR, Strategy and Business Development, to our various majority owned blockchain businesses. This allows our portfolio companies to focus on building and shipping products, faster and with more precision than conventional start-ups.

The whole is greater than the sum of its parts. By investing in, owning, and developing companies at every stage of the blockchain value chain, we produce synergies that would otherwise not be possible. This results in informational and executional advantages for our clients and the companies in our group.



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