

The State of Stablecoins 2019

Hype vs. Reality in the Race for Stable, Global, Digital Money

Presented by:



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George Samman - a leading global cryptocurrency advisor and consultant and the co-author of the KPMG report on Consensus - was commissioned to research the stablecoin landscape and then independently report his findings for the broader industry to learn from. These findings are based on a questionnaire that was sent to all companies actively working on stablecoin projects, and was answered by more than 40 companies. The questionnaires are also available for public review upon request.

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Acknowledgements

We gratefully acknowledge the contributions from:

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David Kittay (Columbia
University)

Todd Massedge

Rafae Omer Ghani

Marie Leaf (Kadena)

Ron Quaranta (WSBA)

Tim Swanson
(Post Oak Labs)

Michal Bacia
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Alex Lebed (Stableunit)

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Josh Chen (Basis)

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Kiran Nagaraj (KPMG)

Damian Jeffree
(Soveren)

John Shipman (PwC)

Ajit Tripathi
(ConsenSys)

Alex Panasuk
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Leon Markovitz
(Stable.Report)

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Foreword

Today, money is broken in some parts of the world – governments have a hard time maintaining stable value in their currencies, which dramatically reduces the wealth of the people in those nations. The result is a severe lack of transparency and trust in many of the world’s monetary systems.

Sixteen countries today face annual inflation rates of more than 20%, whereas other economies face hyperinflation - like Venezuela, where inflation hit 80,000% in 2018. In these situations, it is difficult (if not impossible) for people to save and protect their money, making it increasingly hard for these families to ever dig out of poverty.

The world needs a stable, digital currency that gives people autonomy and control of their money globally.

Cryptocurrencies, like Bitcoin, were developed with the goal of fulfilling this global need. But the high volatility of today’s cryptocurrencies hinders their usefulness. Average citizens need a way to protect their money, a way send money to/receive money from their families in other countries, and merchants need a stable means of exchange in which to do business.

The stablecoin market emerged to fulfill those needs - providing people a stable store of value, a unit of account, and a means of exchange.

And while the stablecoin market has made significant strides in the past year, there is still much work to be done. What’s needed is greater coordination amongst projects, and greater focus on the application of stablecoins to solving real-world problems in the places where they are needed the most.

Working together, 2019 can become the year that stablecoins evolve to become the usable, global, digital currency that the world so desperately needs.

Nevin Freeman, CEO of [Reserve](#)

Table Of Contents

1. Introduction
2. History of Money
 - a. Why Money needs to be stable
 - b. Basic Functions of money
 - c. Characteristics of Money
 - d. Types of monetary systems
 - e. Why have monetary systems have failed
 - f. Failed Pegs
 - g. The Triffin Dilemma
 - h. The Mundell Fleming Trilemma (Impossible Trinity)
 - i. Why contemporary money systems are failing
3. Bitcoin and the rise of cryptocurrency
 - a. Multiplicity of cryptocurrencies
 - b. Local economies
 - c. Complementary currencies
 - d. The History of Complementary Currencies
4. The next generation of cryptocurrencies
 - a. The problems with cryptocurrencies
 - b. The next generation; post-Bitcoin and Ethereum
 - c. Building out infrastructure: The rise of Stablecoins
5. What is a Stablecoin?
 - a. What Stablecoins aim to solve and how they work
 - b. Why end users need stability
 - c. Overview of different stablecoins and what they aim to achieve
 - d. How Stablecoins are different
 - e. Alternatives to stablecoins: Fed Coins and Central bank issued digital dollars
6. Key observations on different stablecoins (compare and contrast) in partnership with PwC
 - a. Note: Based on surveys executed with John Shipman from PwC
7. Next generation stablecoins and money
8. Final Thoughts and Conclusions
9. Key Observations from the Answered Questionnaires
10. Industry Survey Questionnaire
11. Appendix
 - a. Special Breakout Section On Bretton Woods (Appendix 1)
 - b. Acknowledgments
 - c. Citations

Introduction

A stablecoin is a digital token that is meant to hold a stable value. The most common are pegged to fiat or other assets. Some are backed by other cryptocurrencies or a basket of currencies/indexes, while others are not backed by a fiat currency at all. They enable programmatic transactions and a verifiable history.

1. Asset price bubbles and boom and bust cycles are an inevitable byproduct of the current monetary system and both lead to price instability. This is in spite of the fact that modern monetary systems, i.e. all OECD central banks, target price stability as a primary objective. Stablecoins are viewed by many to offer an important evolutionary step in the growing fields of blockchain and cryptocurrency to tackle this challenge.
2. The end of Bretton Woods¹ was a watershed moment in the life cycle of fiat currency and continues to have an impact on monetary policy and its shortcomings to this day.
3. The end of Bretton Woods and the birth of the floating exchange rate system has led to destabilizing hot money flows in and out of emerging markets. This is now affecting even the developed world (e.g. some European countries). As we see a changing world order there is an opening to replace the dollar with a solution that is not simultaneously a national currency. As a result of these changes, countries such as China and Russia may be more open to embracing a stablecoin than the USD.
4. All money systems have trade-offs. A central authority cannot perfectly price the cost of credit/rate of interest over time because of the information problem highlighted by the economist Friedrich Hayek. Central banks have mispriced government debt for more than a decade. This has led to global mispricings of risk: mainly systemic risk. The information problem states that no one entity knows what the proper price should be and central authorities always tend to underestimate the price because it is politically expedient to do so. This means that fiat systems always generate higher rates of growth at the beginning of the cycle, but are burdened with higher amounts of debt later in the cycle, which is managed through lower and lower rates every cycle. This is what we have seen since the 1980s. Many growth-oriented countries, use currency devaluation as a tool to help boost exports, shrink trade deficits and reduce the cost of interest payments on its outstanding government debts.

¹ The end of the gold standard and effectively the beginning of the fiat/floating rate regime.

5. The rise of cryptocurrency as a new asset class has brought about a new economy and paradigm for financial systems. In this rich and diverse ecosystem the development of stablecoins, price-stable digital currencies, may play a critical role in how this new economy achieves mainstream adoption.
6. Stablecoins are a subset of what is becoming the newest wave in the tokenization story: asset-backed tokens. These are digital representations of real assets. This potentially promises to be a multi-trillion dollar marketplace.²
7. Just as in traditional economics where there exists the Impossible Trilemma (Mundell-Fleming Trilemma see below), stablecoins suffer from their own trilemma where you can only have two out of the three desired states:

1) Decentralization

(How open the network is, no central authority, the variability of validators and distribution of confirmation power)

2) Capital Efficiency

(The stablecoin is backed with 100% collateral or less) and

3) Collateralization

(Occurs when a borrower pledges an asset as recourse to the lender in the event that the borrower defaults on the initial loan.)

All projects in the Stablecoin space have been forced to choose two of these three characteristics to build out their vision.

8. Stablecoins and the tokenization of assets could solve many systemic, governmental and commercial challenges. The growth of this new industry has resulted in global regulatory bodies analyzing, and in most cases, supporting the development of regulation to encourage and foster the maximum value for their respective domiciles. The significant regulation developed over the last two years further helps legitimize and set the stage for creating a stable foundation for tokenization, stable-coins and asset-backed tokens to flourish. The states of Wyoming and Arizona is an example of this.³
9. As economic and military power becomes more fragmented, the power that any particular country has to make its currency the dominant one is reduced. In the past, cryptocurrencies did not exist as a 3rd party, non-political alternative.
10. The current environment is conducive to creating a summary of the various legitimate approaches and companies that are developing stablecoins, especially as this burgeoning field catches traction.
11. Questionnaire response summarised can be seen in the Appendix.

² Based on total amount of fiat currency in the world.

³ <https://www.bloomberg.com/news/articles/2018-05-15/wyoming-aims-to-be-america-s-cryptocurrency-capital>

<https://azbigmedia.com/heres-how-arizonas-fintech-sandbox-will-boost-the-economy/>

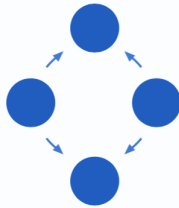
Monetary context – a brief history and why it hasn't worked

Why does money exist? Why do we attribute value to a green piece of paper with a face on it? Why did a shiny yellow metal play such a crucial role in shaping economies? If we go back to the origin of money and currency, both were developed for one primary reason: to settle debts easily prior to the creation of currency or bank notes. As a result, currency solved a variety of challenges:

- With what items could that debt be settled?
- How do you place a value on various items?
- What if you don't have the item the merchant will accept for payment?
- What if you can't transport all the required items for payment?



A STANDARD
of deferred payment
to settle debt



**A MEDIUM
OF EXCHANGE**
which has eliminated
the inefficiencies
of barter

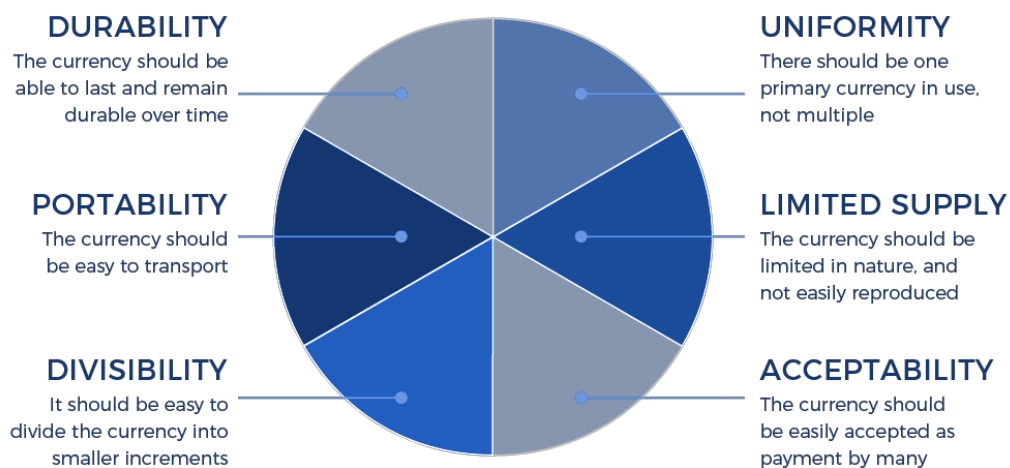


**A UNIT OF
ACCOUNT**
which facilitates
valuation and
calculation



**A STORE
OF VALUE**
which allows economic
transactions to be
conducted over long
periods + geographical
distances

Money can provide an optimal solution to these issues if it has the following characteristics:



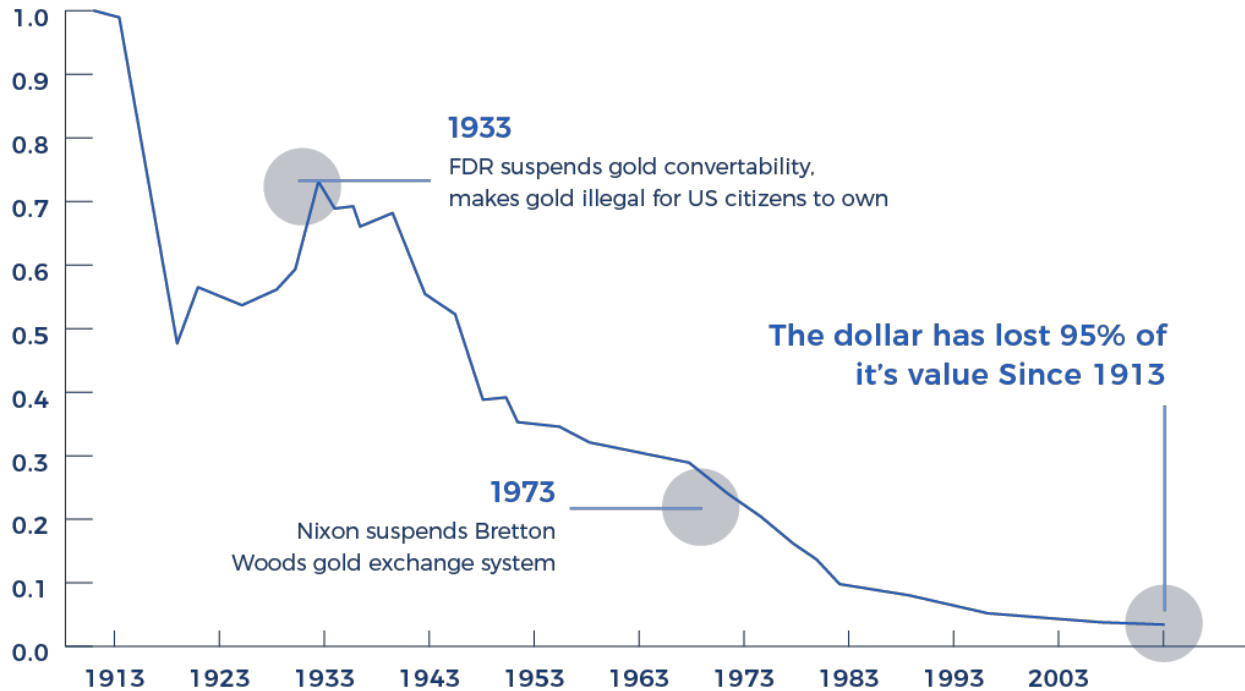
When all of these characteristics work in harmony it creates stability and allows economies to thrive. In an attempt to achieve these ideals, monetary systems were established. Over time, sovereign currencies have provided a reasonable solution by emulating most of the qualities listed above. However, operational imperfections have created challenges to achieving this ideal. Monetary instability has accompanied some of the biggest economic crises in history - from the Great Depression of the 1930s to the Venezuelan hyperinflation that continues to devastate its nation.

But why does money need to be stable? If the value of the national currency changes too much too quickly it fails to fulfill its functions as a store of value or as a medium of exchange. If the value goes down (inflation), no one wants to hold it - people would rather buy commodities, like gold or foreign 'hard' currencies expected to hold its value. If the value goes up (deflation) people are reluctant to spend it, so the amount of transactions in the economy (GDP) decreases and can cause a recession.⁴

Even the US Dollar, which many may view as a 'stable' currency, has been anything but that over time:

⁴ <https://www.investopedia.com/articles/personal-finance/030915/why-deflation-bad-economy.asp>

**THE PURCHASING POWER OF \$1 FROM THE TIME
THE FEDERAL RESERVE WAS ESTABLISHED IN 1913.**



Source: BLS CPI data

Money creation is necessary to stimulate and grow an economy but there are a plethora of factors which can cause instability if it is mismanaged. If it continues for too long it can lead to mispricings in assets by over-inflating their value. If tightened too soon it can lead to major contractions in the economy. Stability is key to maintaining a strong economy but it is much more difficult in practice than in theory. Governments throughout history have implemented a variety of strategies in an attempt to maintain stability but have generally fallen short or in some cases caused outright chaos.⁵ The various reasons why these strategies have failed are discussed throughout this section of the paper.

⁵ Some of these factors are out of the government's control, such as the economic bubble fueled by hot money in Thailand leading up to the Asian Financial Crisis. Other factors are caused directly by the governments. Also in the lead up to the Asian Financial Crisis the corrupt intervention of the Malaysian government in stamping out competition created what was termed "crony capitalism" which caused inefficient distribution of short-term capital flow.

The Various Types of Monetary Systems

Many different types of monetary systems have been used throughout history and each of them has their individual flaws.

TYPE OF MONEY SYSTEM	EXAMPLES	DEFINITION
Reserve Currency Pegs	Gold Standard, Bretton Woods	Pegging and backing the currency to some sort of physical asset like gold
Currency Boards	Many emerging economies	Pegging and backing the domestic currency to the currency of another country
Basket of Currencies	SDRs	Pegging the currency to multiple different currencies instead of just one
Basket of Commodities	John Nash Sound Money	Pegging the currency to multiple different commodities instead of just one
Current Bands	ERM	A peg to another country's currency that allows the domestic currency to move within a pre-specified range
Crawling Pegs	Many	A peg that allows appreciation or depreciation of a currency to happen over time
Currency Substitution	The Euro	Substituting the domestic currency for an entirely different one
Floating Exchange Rates	Many	Allowing the exchange rates to float freely and have their value determined by the capital markets

There are really two main types of monetary systems: **fixed rate** and **floating rate**. Today, floating exchange rate systems are primarily used, meaning the capital markets determine the price of currencies. This has created issues in many different countries where economic crises and hyperinflation have decimated the value of certain currencies. In contrast, fixed exchange rate systems are considered to be much more stable, but in almost every case they end up being just as volatile as floating rate systems. Within a fixed rate system there is typically some type of peg, whether it is a peg to gold or a fiat currency such as the US Dollar.

“When a nation pegs its currency to another currency, it does so by (a) holding foreign currency in reserve and using it to maintain a buy-wall for its domestic currency at a particular price, and (b) minting as much of its domestic currency as needed to maintain a sell-wall on it for that same price, against whichever foreign currency it is pegged to. (b) is the easy part, since it can mint as much of its domestic currency as it wants. (a) is more difficult - when it runs out of foreign currency or decides not to spend any more of its foreign currencies in reserve to defend the peg, it can't maintain the buy-wall anymore and this is what leads to pegs breaking. This means that there are only two features of a traditional exchange-rate peg one needs to understand in order to predict whether it will hold:

- The total value of foreign currencies the party holds in reserve.
- Whether the party will choose to spend these currencies maintaining a buy-wall

One more important nuance is that in order to peg currency A to currency B a party doesn't necessarily need to hold currency B in reserve. It can hold any valuable asset that has liquid and accessible markets. For example, a nation could hold gold in order to peg its currency to USD. So long as it's always willing to pay one dollar worth of gold for one unit of its domestic currency (at the present USD market price of gold), it will be able to stabilize the price of its currency at \$1.”⁶

Some variation of pegging has been the most commonly used monetary system throughout the history of money. It worked quite simply. For example, in the early days of the gold standard, one US dollar could be

⁶ Why Another Stablecoin by Nevin Freeman

exchanged for 24.75 grains of gold. Therefore, as long as the outstanding supply of gold was stable and the supply of dollars in circulation were stable, the value of the US dollar should remain stable. While it appears reliable in theory almost every example of pegging fell apart, typically due to an economic crisis where governments needed to print more money and were either unable or unwilling to do so.⁷ A counter-argument to this is that currency pegs do not fall apart because of a crisis but because of the temptation to expand government spending during times of stability. Alan Greenspan, former Chair of the Federal Reserve of the United States, came to the conclusion that “currency pegs don’t work because in order for a peg to work you need to be fiscally responsible, but if you are fiscally responsible you don’t need a peg.”⁸

Here are just a few examples, which will be expanded on below:

The Gold Standard – Reserve Currency Peg to Gold

The Revolutionary War -----

The American colonies lacked the finances to rebel so they coined “The Continental” to finance the war. This currency was easily counterfeited, so Britain counterfeited as much as they could. Between counterfeiting and excess money printing, the value of the continental became, in certain cases, only worth 1/1000th of its original face value causing massive inflation.⁹

The Civil War -----

The US government needed to raise money for the war. The money supply increases and gold prices spike as the dollar is devalued.

World War 1 -----

Economic crisis force governments’ hands to raise money. Gold convertibility suspended in multiple countries. The money supply increases and depreciates many currencies.

The Great Depression -----

Excessive lending and the stock market collapse leads to multiple banks failing. The newly created FED is forced to print money to inject liquidity into the system and President Roosevelt suspends gold convertibility. The dollar is devalued yet again.

⁷ For example, the Thai baht following the Asian Financial Crisis in 1996-1997.

⁸ Sebastian Mallaby “The Man Who Knew: The Life and Times of Alan Greenspan”

⁹ <https://core.ac.uk/download/pdf/6690360.pdf>

Bretton Woods – Reserve Currency Peg to the US Dollar (still convertible to gold)

Failed Peg -----

As other countries grew stronger after World War II and the US economy started to decline, countries included in Bretton Woods no longer wanted to peg their currency to the overvalued dollar. Many began converting their dollars to gold and eventually, some started leaving. When President Nixon ended gold convertibility it essentially ended Bretton Woods and the dollar continued its multi-decade depreciation.

European Exchange Rate Mechanism (ERM) – Currency Bands -----

Britain, George Soros, and Failed Currency Bands - Upon realizing how wildly overvalued the pound was, George Soros and his hedge fund, the Quantum Fund, placed a \$10 billion bet against the pound.¹⁰ The size of the short selling, as well as Britain's limited reserves, were unable to keep the pound within the required currency bands without damaging the economy and were forced to leave the ERM, immediately causing a massive drop in the value of the pound.

The European Union – Currency Substitution -----

Greece Bailout - With an overburdening debt load and a weak economy, the International Monetary Fund (IMF) and European Central Bank (ECB) have bailed out Greece multiple times at the expense of other countries in the European Union.

Creation of Coins

The first coins appeared on the Southern coast of modern-day Turkey in the kingdoms of Lydia and Ionia around 640 B.C.E. These coins were made of electrum—a naturally occurring alloy of gold and silver. Eventually, the Lydians devised a way to separate the gold and silver and created coins of each metal. The “sweat of the sun” and “tears of the moon,” as the Incas called gold and silver, were natural candidates for coins. They are rare, do not break down, and unlike other metals like iron, they do not rust.

The creation of coins allowed for some of the ideal characteristics of money to finally come to fruition. First, thanks to their rarity, a somewhat limited supply were established. Second, because they don't rust, they were durable. Third, while not perfectly divisible, they were much better than previous alternatives. Fourth, by establishing the coins as a primary means of payment, the Lydians made the coins both acceptable and uniform. As expected, there were still issues. While much more portable than transporting animals, moving mass quantities of coins was still no easy task. Price stability was still an issue as well, as the Spanish government of the 1500's learned.

¹⁰ While Soros had a hand in this it is unclear how much of an impact Soros actually had on the depegging itself: <http://web.mit.edu/krugman/www/crises.html>

In the early 1500's, the Spanish crossed the Atlantic in search of a fortune. Francisco Pizarro, son of a Spanish colonel, eventually stumbled upon the Incan Empire, rich with gold and silver. The Spanish collected a massive fortune of gold and silver which was sent back to Spain. Yet even with their newfound riches, the Spanish couldn't bring the rebellious Dutch Republic to heel, couldn't secure England for the Spanish crown, and couldn't save Spain from an economic decline. Why? With all their newfound gold and silver, they increased the supply and unintentionally devalued the metals. While the creation of coins was certainly a step in the right direction it was not enough to maintain stability.

Leverage

During this same period, in Holland and Vienna, initial experiments with modern financial tools began with the introduction of banks, lending, and increasing the money supply by holding partial reserves. This proved to be so successful that Spain, with its complacent focus on physical gold and silver, completely missed this phase in the development of monetary systems. The rest of the world, however, was left with a money supply that could expand as it was lent out, and contract as loans were called in. The money was able to work harder and do more in times of high confidence, resulting in periods of extreme exuberance followed by periods of forced liquidation and severe lack of liquid currency.

The Dollar and the Gold Standard

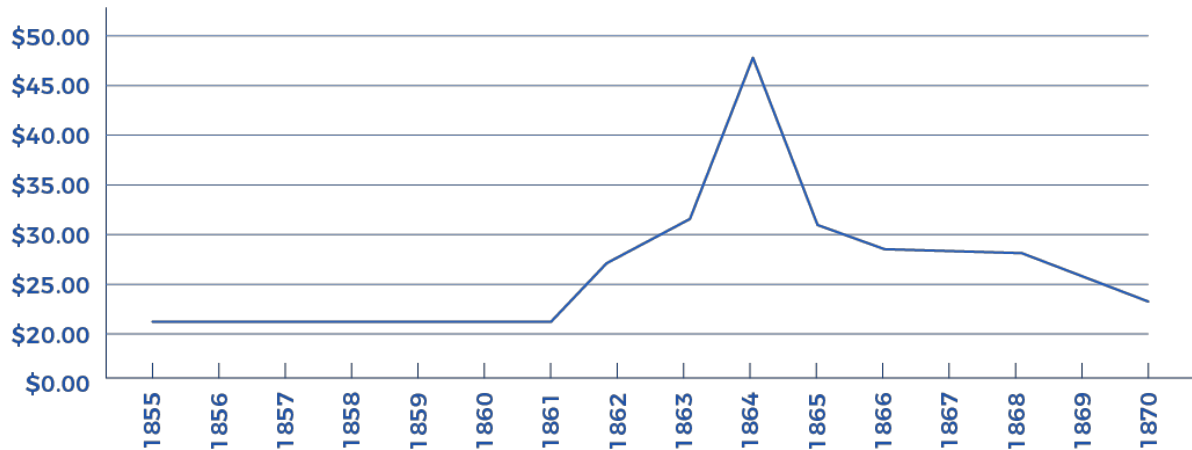
The history of money in the US also began with gold and silver. The Coinage Act of 1792 fixed the U.S. dollar to the price of gold and silver, meaning you could exchange 1 dollar for 371.25 grains of silver or 24.75 grains of gold. This conversion rate to gold and silver is known as a "bimetal standard". In 1900 the U.S. switched over to a pure gold standard.

The key advantage of the gold standard is it limited the government's ability to create money, which as mentioned earlier, is key in maintaining the stability of a currency's value. However, it did not stop governments from raising additional money and abandoning convertibility of the US dollar into gold.

Failure #1) The Civil War

To help finance the civil war, President Lincoln issued \$450 million in paper notes, known as "greenbacks". These were early examples of what came to be known as "fiat" money, that is, money not backed by anything tangible. Sure enough, with more currency in circulation and no change in the amount of gold, gold prices temporarily shot sharply up.

PRICE PER OUNCE OF GOLD (USD)



Source: onlygold.com

While this may be a less extreme example since prices returned to normal, the following are examples which were not so easily recovered.

Failure #2: World War I

When Archduke Franz Ferdinand, heir to the Austrian throne, was assassinated in June 1914, it set off a disastrous chain of events. Investors began to panic that the Balkan crisis at the time would escalate into a full-blown European war. That, in turn, led to panic selling, prices crashing, liquidity completely drying up, and exchange rates going haywire as investors tried to repatriate their cash back home. The amount of debt and leverage in the system only made things worse as banks were forced to recall loans.

With rising panic, it didn't take long before Austrian citizens were lining up at banks to convert their money into gold. Even though the whole concept of the gold standard was to allow this convertibility to happen, there is never any guarantee in a crisis. Sure enough, multiple countries, starting with Russia, suspended convertibility into gold, thus demonstrating one of the first examples of the failure of the gold standard. With the liquidity crisis and the bills racking up for the war, governments once again began printing more money resulting in severe inflation for many countries.¹¹

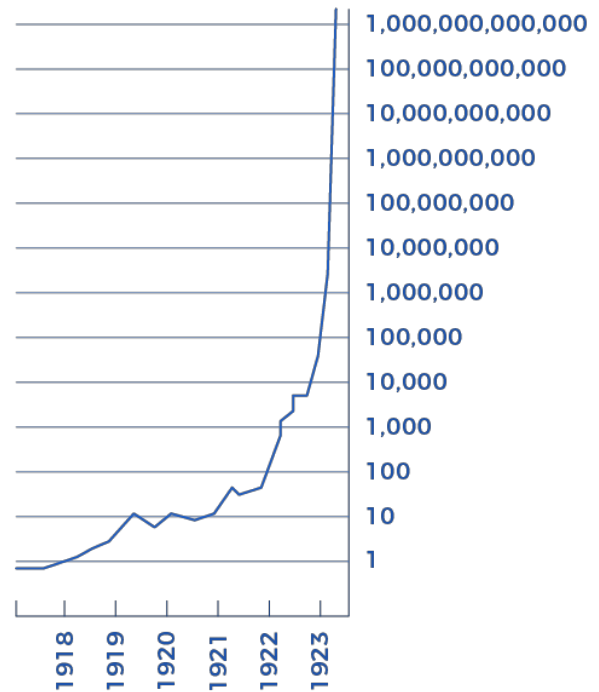
Source: bls.gov/cpi/

¹¹ The German Mark's inflation had less to do with printing money for the war - and more to do with printing money to repay large war reparations.

GERMAN MARKS

Date	German marks needed to buy one ounce of gold
Jan. 1919.....	170
Sept. 1919.....	499
Jan. 1920.....	1,340
Sept. 1920.....	1,201
Jan. 1921.....	1,349
Sept. 1921.....	2,175
Jan. 1922.....	3,976
Sept. 1922.....	30,381
Jan. 1923.....	372,477
Sept. 1923.....	269,493,000
Oct. 2, 1923.....	6.631,749,000
Oct. 9, 1923.....	24,868,950,000
Oct. 16, 1923.....	84,969,072,000
Oct. 23, 1923.....	1,160,552,882,000
Oct. 30, 1923.....	1,347,070,000,000
Nov. 5, 1923.....	8,700,000,000,000
Nov. 30, 1923.....	87,000,000,000,000

VALUE OF 1 GERMAN MARK



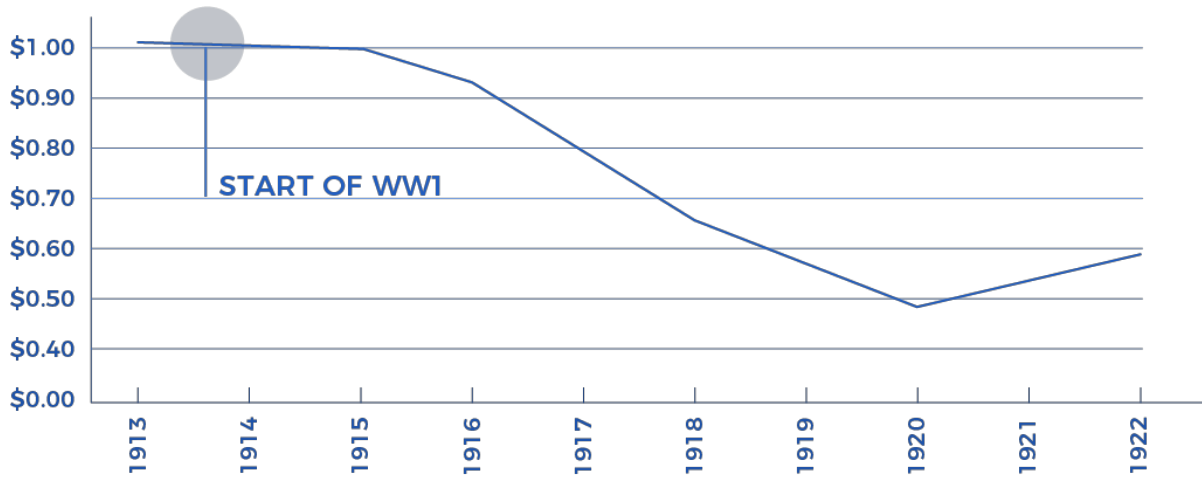
Source: The Economics of Inflation

Failure #3: The Great Depression

Prior to the Great Depression, the United States was thriving. Throughout the Roaring 20's, the nation's wealth more than doubled. Americans with their newfound wealth were pouring money into the stock market, driving prices through the roof, thanks to banks freely lending investors' money on margin. Yet, like every bubble, all good things typically come to an end. The stock market began to tank and banks were forced to call back loans to investors. Investors were already deep in the red and unable to pay back their loans. Nervous that the banks would fail, citizens began lining up to withdraw their deposits from the bank. Sure enough, banks began to fail.

Instead of injecting liquidity into the system, the newly created Federal Reserve reduced credit outstanding, forcing more and more banks to sell assets in panic. At the same time, foreign investors were trying to convert dollars to gold, especially with Britain abandoning the gold standard in September 1931. The Fed raised interest rates to try and halt the external drain, but it was too late at that point. To prevent the depression from getting any worse, President Roosevelt declared that citizens could no longer exchange dollars for gold and must surrender their gold over to the government. This caused a sharp rise in the price of gold and a gross devaluation of the dollar. With all this new gold in their pockets, the US government was able to circulate more than \$3 billion in paper currency, once again increasing the money supply.

VALUE OF (1) 1913 US DOLLAR THROUGH 1922



Source: bls.gov/cpi/

Bretton Woods, Fixed Exchange Rates, And Currency Pegs

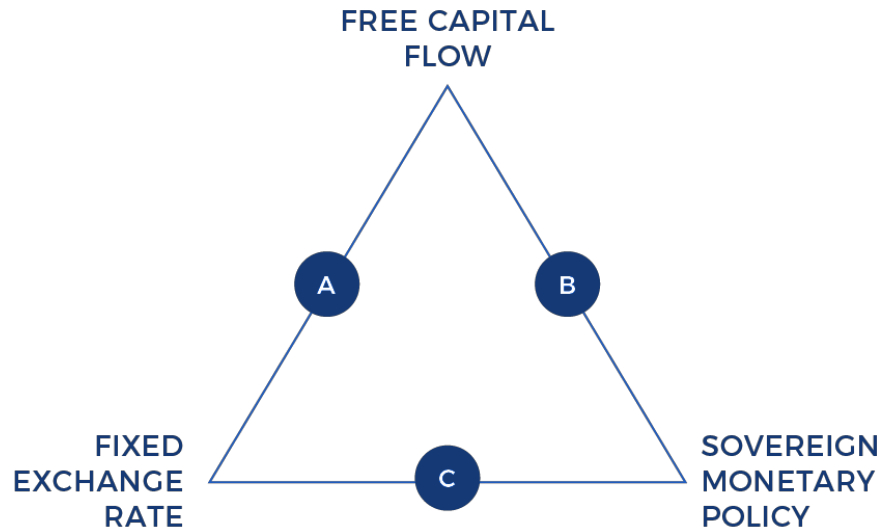
Note: For a detailed breakdown of Bretton Woods read Appendix 1 “Special Breakout Section on Bretton Woods”

After World War II a dramatic change to the monetary system took place with the Allies introducing the Bretton Woods system. The concept was simple: exchange rates would be fixed no longer to gold, but instead pegged to the US dollar as the new international reserve currency (the dollar could still be exchanged for gold, but only at the national accounts level by governments and their central banks). No longer could an individual go to his banks and ask for his demand deposits to be converted instantly as was the case during the classical gold standard.

The International Monetary Fund (IMF) and the World Bank were created to oversee this new world order using tools such as structural adjustment programs to bring capitalism to the developing world. The IMF was designed to regulate exchange rates, whereas the World Bank was supposed to help rebuild devastated countries. The Bretton Woods system wasn't without its flaws. The system created what came to be known as the *Mundell-Fleming Trilemma*. The Trilemma theorizes that governments can only maintain two out of the following three options simultaneously:

1. Full freedom of cross-border capital movements
2. A fixed exchange rate
3. An independent monetary policy oriented towards domestic objectives

For example, since US Dollar is the reserve currency it has the full freedom of cross-border capital movements and an independent monetary policy which targets the rate of inflation and unemployment but does not have its exchange rate pegged to another currency.

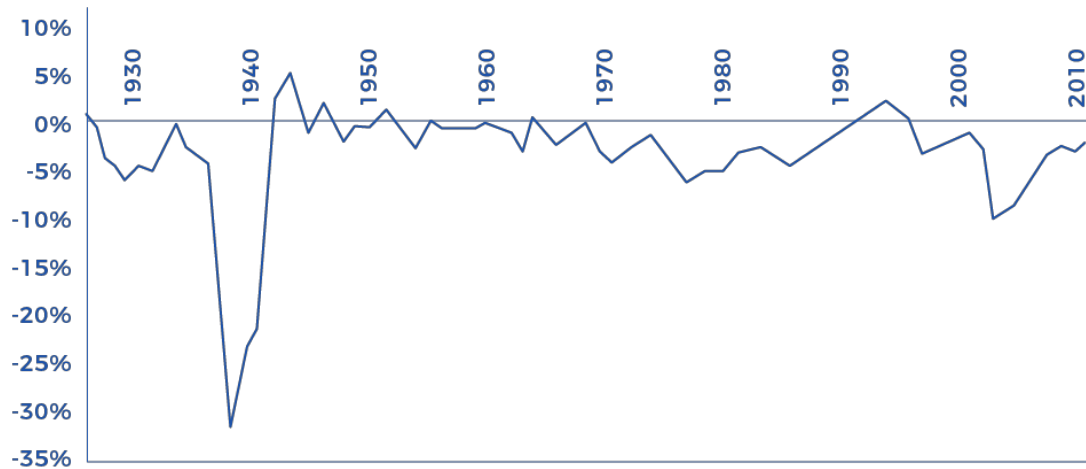


The reason this trilemma exists in the modern era of floating exchange rates is that if, for example, a central bank wants to allow capital to flow into a country, unencumbered, while maintaining a peg, it must be prepared to sell its own currency in exchange for the currencies depreciating against it. In this instance, a central bank is using its monetary policy to make sure the peg is maintained while not maintaining the same level of stability in the domestic market which may be seeing double-digit inflation. Another example which may be more common is in the case of capital flight where a Central Bank is selling foreign exchange (FOREX) reserves and raising interest rates in order to prevent the flight of capital, which could cause a deep contraction domestically.

Under Bretton Woods, the Western nation-states opted to forgo full freedom of capital flow across borders in favor of fixed exchange rates and the ability to maintain an independent monetary policy. When capital did flow across borders, it would go directly from government to government.

In addition to complex decisions imparted by the trilemma, economists needed to address *The Triffin Dilemma*, which postulated that there would be specific conflicts of interest between domestic and international objectives for countries that provide for global reserve currencies. For example, since the US Dollar is the reserve currency it leads to an imbalance in the balance of payments (e.g. the current account). This is due to inflows and outflows of US dollars associated with being a reserve currency. With the dollar as the primary international reserve currency, the conflict of interest was even greater. Over time, American aid became particularly hedged by political and military conditions that were not always in the best interest of the recipients. By the 1960's, US deficits were negligible compared to today, but large enough for France to complain that the US was exploiting its reserve currency status to collect seigniorage from foreign creditors, prompting President de Gaulle to increase the rate of repatriation to France, causing a slow run on the US dollar.

ANNUAL BUDGET DEFICIT OR SURPLUS AS A PERCENTAGE OF GDP (1930 - 2017)



Source: bls.gov/cpi/

John Maynard Keynes had foreseen this issue at Bretton Woods and at the time proposed creating a supranational currency, Bancor, that would be used in international trade. With the selection of the dollar as the international reserve currency, Bancor never came into existence. The IMF also tried to tackle this issue with the creation of Special Drawing Rights (SDRs) in 1969. Essentially the idea was to make the international reserve currency a basket of different currencies, with proportions being revisited and potentially new currencies added every 5 years. This concept never had a chance to grow big enough to overtake the dollar, with the Bretton Woods system collapsing a few years later.

Failure #1: Failed Pegs & The End of Bretton Woods

For the first few years of Bretton Woods, things were working well, with most countries wanting US dollars to buy US goods. Yet from 1950 to 1969, Japan and Germany began to recover and the US share of the world's economic output dropped significantly, from 35% to 27%. At the same time, increasing debt from the Vietnam War and monetary inflation by the Federal Reserve caused the dollar to become increasingly overvalued in the 1960s. Simply put: the dollar was getting overvalued and members of Bretton Woods were not happy with the peg to the dollar anymore.

In February 1965, French President Charles de Gaulle announced his intention to exchange its U.S. dollar reserves for gold. By 1971, the US money supply had increased by 10%. In May 1971, West Germany left the Bretton Woods system, unwilling to revalue the Deutsche Mark. Other nations began to follow suit. Switzerland redeemed \$50 million in July, and France acquired \$191 million in gold.¹²

In August, the United States Congress released a report recommending devaluation of the dollar in an effort to protect the dollar against "foreign price-gougers". A few days later, as the dollar dropped in value against European currencies, Switzerland left the Bretton Woods system. By August 15th, President Nixon announced he was suspending the convertibility of the US dollar to gold. By 1973 the fixed exchange rate system became a floating exchange rate system and once again open to speculation and manipulation by investors. With the end of Bretton Woods and increase in money supply over time, the US dollar unsurprisingly continued its decline.

¹² http://economics.ucdavis.edu/events/papers/copy2_of_417Bordo.pdf

The European Exchange Rate Mechanism

After Bretton Woods fell apart the European countries decided to come together and create a Pan-European market to compete with the US. It started with the European Coal and Steel (ECSC) that was put together in 1951 by the treaty of Paris, with the objective of helping to unify the continent through diplomacy rather than by force. This culminated in the European Exchange Rate Mechanism (ERM) to be created in 1979, which was the precursor to the European Monetary Union (EMU). Countries weren't ready to give up their national currencies, but they agreed to fix their exchange rates within narrow trading bands of each other instead of letting their currencies continue to 'float' and let capital markets set rates.

Since Germany had the strongest economy in Europe, each country set their currency's value in Deutschmarks. There were also political reasons which may have been more important to tie Germany to Europe, particularly around not wanting another world war and the theory that economic integration would bring both economic and political stability. They agreed to maintain the exchange rate between their currency and the Deutschmark within an acceptable band of plus or minus 6% of the agreed-upon rate.

Similar to Bretton Woods, governments were required to participate in the market and nudge their currency in the agreed-upon direction to keep the exchange rate fixed. Governments can manage their currency in multiple ways:

1. They can take their reserves of foreign currency and buy up their own currency on the open market. The contraction of supply causes the currency to appreciate.
2. Or do the opposite (i.e. sell their own currency on the open market for foreign currency), which depreciates the currency.
3. To make the currency appreciate, they can raise interest rates to entice people to buy the currency and lend that money at higher rates.
4. To make the currency depreciate, they can cut interest rates; capital is then motivated to find investments with returns.

Central banks must be very careful with changing interest rates, as they affect the whole economy. Alongside government spending, adjusting interest rates is one the main tools governments can use to adjust the economy. If the country is experiencing a recession, the government might cut interest rates to spur investment and spending. If inflation is high, the government might raise rates to shrink the supply of money. Adjusting reserve requirements and targeting the money supply directly are also very powerful tools.

In the latter case, this is something that Federal Reserve Governor Paul Volcker did in 1979 with his "Saturday Night Special."¹³ In the case of the former, the reason why lowering or raising reserve requirements is more powerful is because it has an exponential effect on bank lending. If banks can lend 9x capital as opposed to, say 8x (the difference between 10% reserve requirement and 12.5% reserve requirement), the money supply can grow much more rapidly.

As a research paper from the Federal Reserve itself states:

"The use of reserve requirements as a supplemental tool of monetary policy was particularly prevalent in the 1960s and 1970s, as the Federal Reserve sought to influence the expansion of money and credit in part by manipulating bank funding costs. As financial innovation spawned new sources of bank funding, the Federal Reserve began to adapt reserve requirements to these new financial products and often changed requirements on the specific bank liabilities that were most frequently used as marginal sources of funding. As banks began to rely more heavily on the issuance of large-denomination time deposits (CDs) to fund their asset acquisitions in the 1960s, for example, the Federal Reserve began periodically to alter reserve requirements on these instruments, thereby affecting their cost of issuance and in turn the supply of credit through banks."¹⁴

¹³ Fed Reserve Chairman Paul Volcker abruptly announced a change in Fed policy that sent interest rates skyrocketing and brought on a recession.

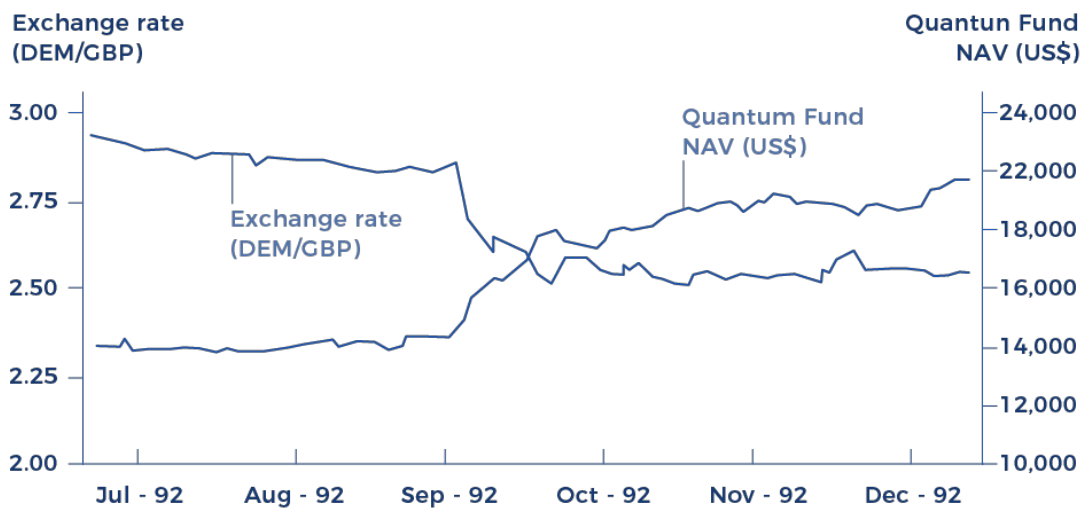
¹⁴ <https://www.federalreserve.gov/monetarypolicy/0693lead.pdf>

Failure #1: Britain, George Soros, and Failed Currency Bands

Britain entered the ERM in 1990 at an exchange rate of 2.95 Deutschmark (DM) for each British pound (GBP). The British government was obligated to keep the exchange rate within the 2.78 DM to 3.13 DM band¹⁵. Things worked quite well for about two years. In 1992, Britain fell into a recession with unemployment spiking to almost 13%. Normally, Britain could spur investment and spending by cutting interest rates during an employment crisis. In this case, doing so would push the pound's value below the agreed-upon rate. Therefore, the government's hands were tied. This led to the pound being materially overvalued.

At the same time, a new investment vehicle known as a 'hedge fund', had been becoming more prominent. A notable hedge fund manager, George Soros of the Quantum Fund, caught wind of what was going on in Europe. His fund began short selling the pound, that is borrowing pounds and using them to buy deutschmarks while maintaining other long and short currency positions. The Quantum Fund had shorted over \$10 billion worth of pounds, and other hedge funds began mimicking the trade. The Bank of England, with its limited reserves, couldn't buy enough pounds to keep the currency propped up within the required currency band. They tried raising interest rates twice, from 10% to 12% and 12% to 15% to keep investors interested, but their strategy didn't work. It didn't take long before they were forced to leave the ERM, resulting in the pound significantly declining in value, and a multi-billion dollar profit for Soros and his Quantum fund.

EXCHANGE RATE / QUANTUM FUND



Source: Valuewalk.com

Are Fiat Money Systems Doomed To Failure?

A currency crisis occurs when there is serious doubt that a country will be able to maintain its peg (exchange) because there becomes massive speculation that the central bank does not have sufficient reserves to maintain the peg to a fixed exchange rate. A speculative attack on the currency usually follows to test the resolve of the central bank to defend the peg. Generally what follows is a devaluation of the currency.

¹⁵ <https://priceconomics.com/the-trade-of-the-century-when-george-soros-broke/>

No fiat money system has ever led to true long term price stability. Since the 1980's, there have been more than 80 different currency crises in various countries, many of these countries with completely different money systems. In fact, the average life of fiat (government-decreed) currency is only 27 years and perhaps shorter if you take currency regime changes like Bretton Woods into account.¹⁶ One of the main reasons for this is national currencies have to deal with socio-economic factors. "National currencies (governmental currencies) are subject to "economic sentiment concerns"- the vagaries of the government and banking institutions that run those countries, such as quantitative easing (e.g. US) and capital controls (e.g. China), inflation (e.g. Zimbabwe), employment levels, growth and high national debt levels. These concerns arise from inconsistencies in governing policies and philosophies, which may not be in the best interests of the holders of each country's currency. These actions tend to undermine the success of national currencies."¹⁷ As discussed later cryptocurrencies have concerns of their own: mainly volatility and speculation.

18

NOTABLE COUNTRIES WITH CURRENCY CRISIS' SINCE THE 1980'S

Afghanistan	Brazil	Ethiopia	Ireland	N. Korea	Thailand
Albania	Bulgaria	Fiji	Italy	Peru	Turkey
Algeria	Canada	Finland	Japan	Philippines	Ukraine
Angola	Chile	Gabon	Jordan	Portugal	UK
Argentina	China	Ghana	Kazakhstan	Russia	USA
Armenia	Columbia	Greece	Kenya	Singapore	Uruguay
Azerbaijan	The Congo	Hong Kong	Latvia	Somolia	Uzbekistan
Bahrain	Cuba	Hungary	Libya	S. Africa	Venezuela
Bangladesh	Cyprus	Iceland	Malawi	S. Korea	Vietnam
Barbados	Czech Republic	India	Malaysia	Spain	Yemen
Belarus	Dominican Rp.	Indonesia	Mexico	Sudan	Zambia
Bhutan	Ecuador	Iran	Moldova	Syria	Zimbabwe
Bolivia	Egypt	Iraq	Nigeria	Taiwan	

Some recent crises, such as the Venezuelan Bolivar and Angolan Kwanza, have been extremely severe:

¹⁶ <https://www.forbes.com/sites/ralphbenko/2011/08/29/u-s-elites-begin-to-confront-the-paper-dollar/#7db24022f15b>

¹⁷ <https://www.coindesk.com/bitcoin-explained-global-currency-wall-street-veteran/>

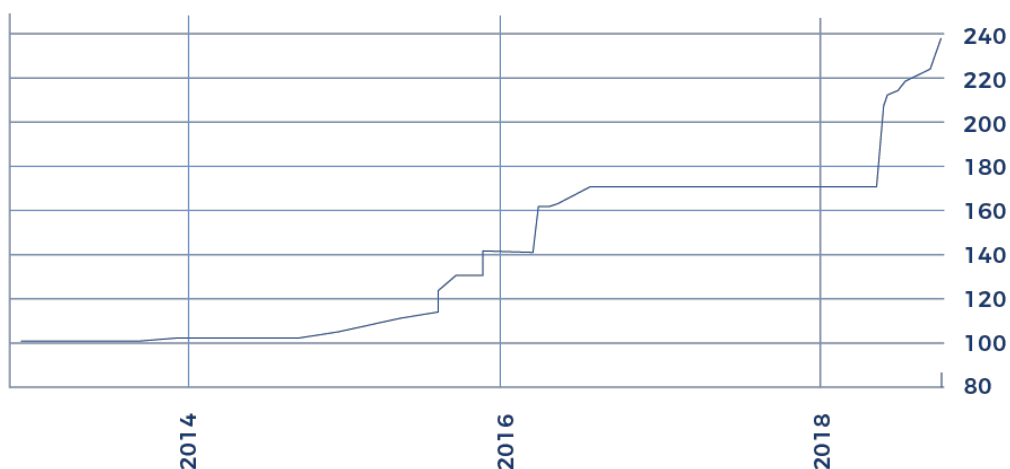
¹⁸ Source: tradingeconomics.com

VENEZUELA CURRENCY CRISIS



Source: tradigneconomics.com

ANGOLAN CURRENCY CRISIS



Source: tradigneconomics.com

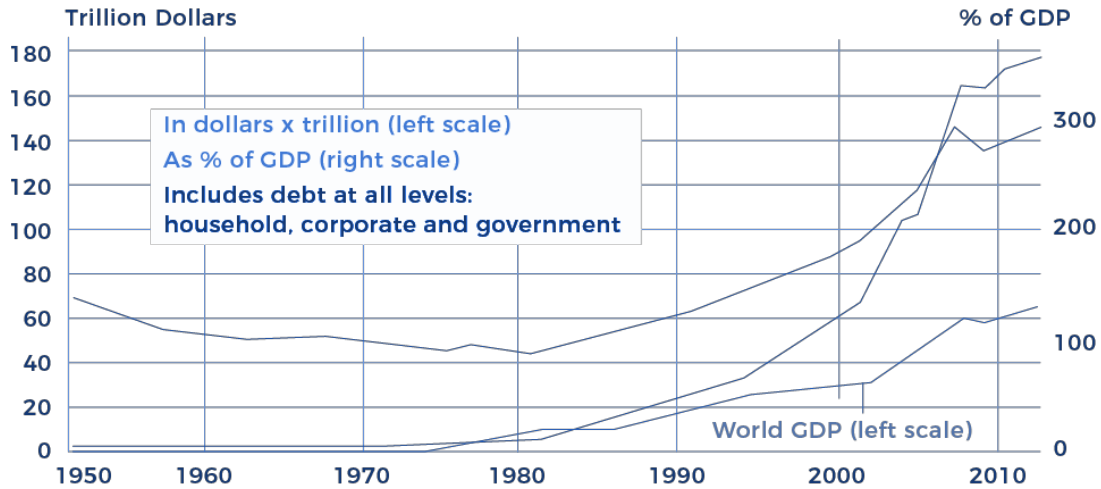
So why are money systems failing? It really comes down to 5 main factors embodied in the examples earlier:

1. Fiat currency backed by nothing
2. A centralized authority with control over interest rates and the money supply
3. Global debt levels
4. Unfunded Liabilities
5. Military Spending

The secular reduction in interest rates may have been one of the single most important enablers of the huge run-up in private sector debt since the early 1980's. (Others include deregulation and the growth of derivatives.) The lower interest rate environment has created a persistently (and perhaps unnatural) demand for yield by investors, contributing significantly to the asset price inflation seen particularly in stocks and real estate. Additional contributing factors include a substantial period of social and political euphoria after the fall of the Berlin Wall leading to higher levels of speculation, the inflow of foreign savings due to globalization, financial deregulation (particularly in the United States), and declining oil prices, amongst other factors. To make matters worse, this decrease in interest rates was not driven by market forces alone but

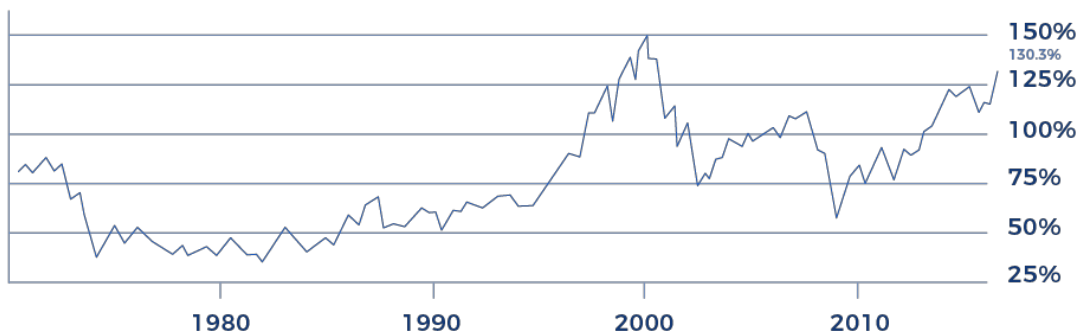
other factors such as social mood and a bond bull market as well as the intervention of the Federal Reserve and other Central Banks.

TOTAL GLOBAL CREDIT-MARKET DEBT OWED



Source: US Federal Reserve / BIS / Economist / World Bank

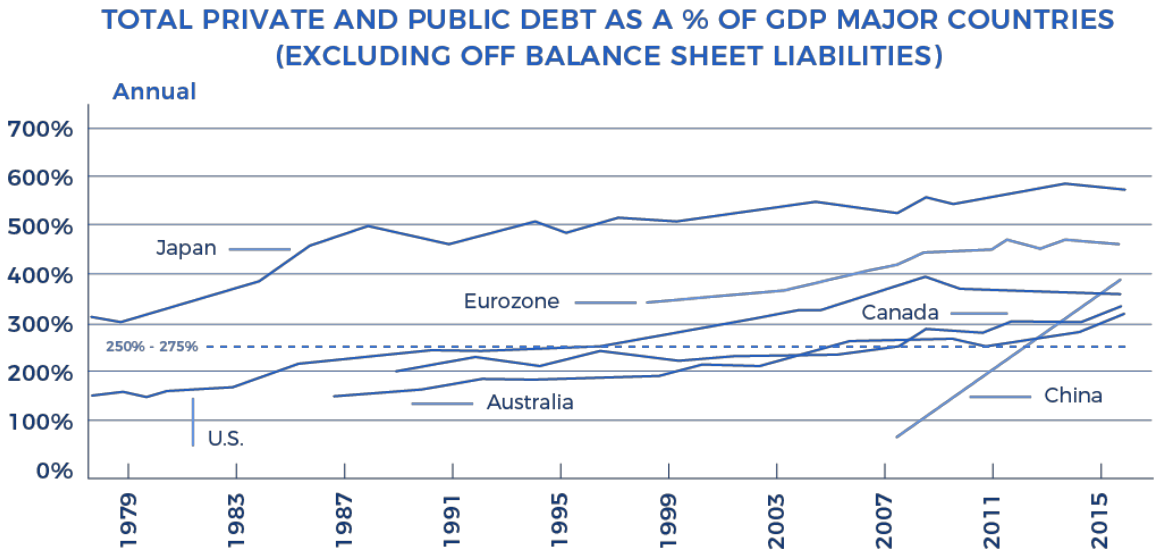
TMC / GDP



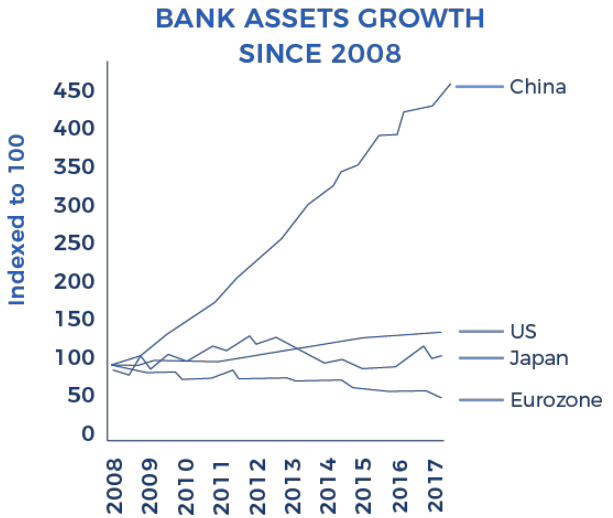
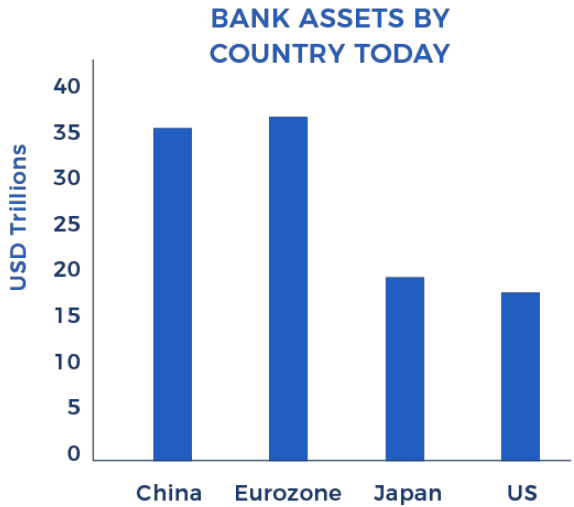
Most people believe that the Federal Reserve has warded off short-term disaster through Quantitative Easing¹⁹ policies while not fixing the longer term structural problems by allowing debt levels to continue to increase since the recession of 2008 - 2009. While this is part of the narrative there are other factors at work beyond simply the Fed's loose monetary policy. Other countries have been no better, with China being one of the worst; China's bank assets (loans) have been increasing exponentially since the crisis.

¹⁹ A tool the Federal Reserve and other Central banks used to purchase large scale assets. This is considered expansionary monetary policy as a predetermined amount of financial assets are purchased to stimulate the economy and increase liquidity.

In a global reserve, fiat money system, GDP growth is dependent on growth in the stock of money and almost all of the money supply is created through the issuance of new debt, mostly by private banks. ²⁰If the US, for example, tried to decrease its deficit and begin to pay down its debt the supply of \$ would start decreasing. Unless this decrease would be compensated by new debt issue by the private sector, the US would probably go into depression. And, because \$ is the global reserve currency, the world would go into depression too, or, it would need to abandon the dollar. In other words, the country responsible for serving as the stable, reserve currency for the world would be perpetually in deficit. .



**ON-BALANCE-SHEET BANKING ASSETS:
SHEER SIZE + GROWTH REVEAL CHINA'S PONZI FINANCE REGIME**



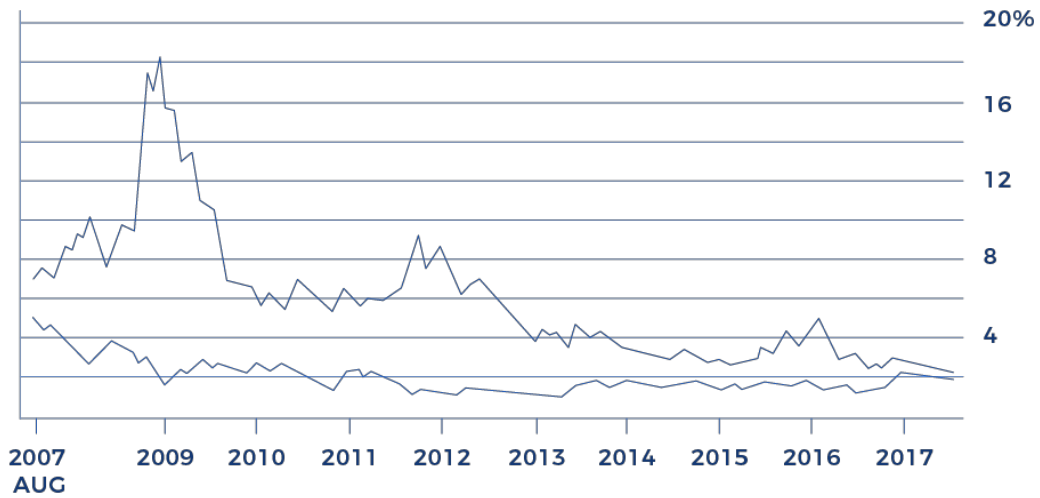
Source: China Banking Regulatory Commission, Federal Reserve, Bank Of Japan, European Central Bank

²⁰ <https://medium.com/the-mission/what-is-the-blockchain-solution-for-the-real-economy-and-why-it-will-never-be-bitcoin-3080983c8799>.

At the same time, the global bond market has turned into a massive bubble, with more than \$9 trillion of “negative yielding bonds” outstanding and EU “junk” bonds trading in line with US Treasuries, despite their higher debt-to-GDP ratios.

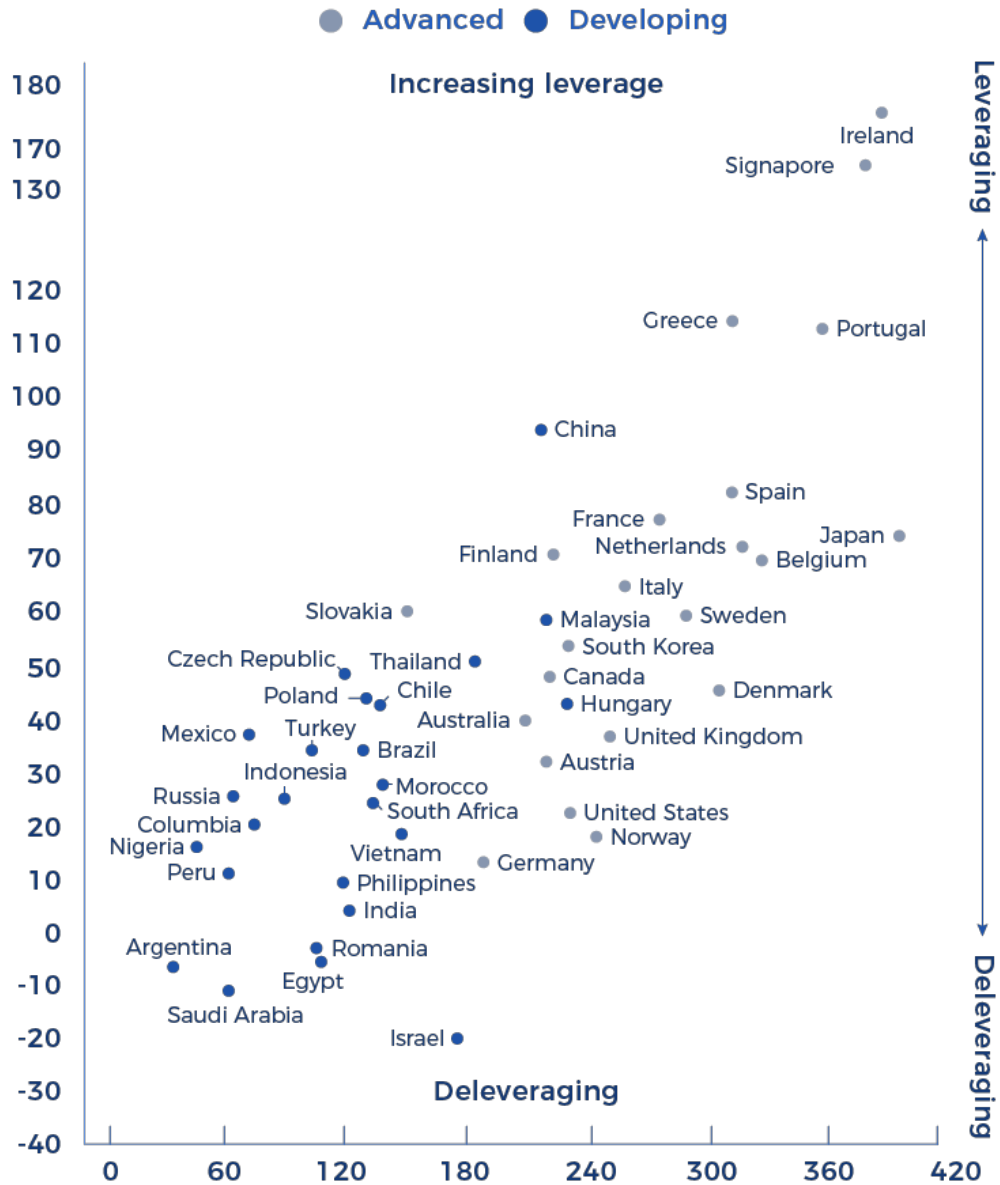
REALITY CHECK BB-RATED EURO BONDS YIELD AS LITTLE AS TREASURIES

— BofA Merrill Lynch U.S. Treasury Index — BofA Merrill Lynch BB Euro High Yield Index



The increase in entitlement spending in the US has only made the debt problem worse. Well-known investors such as Stan Druckenmiller estimate that the US debt is actually greater than \$200 trillion if you take into account the present value of US entitlement spending. Yet relative to other countries, US liabilities actually appear manageable.

CHANGE IN DEBT-TO-GDP RATIO 2007 - 2014 PERCENTAGE POINTS

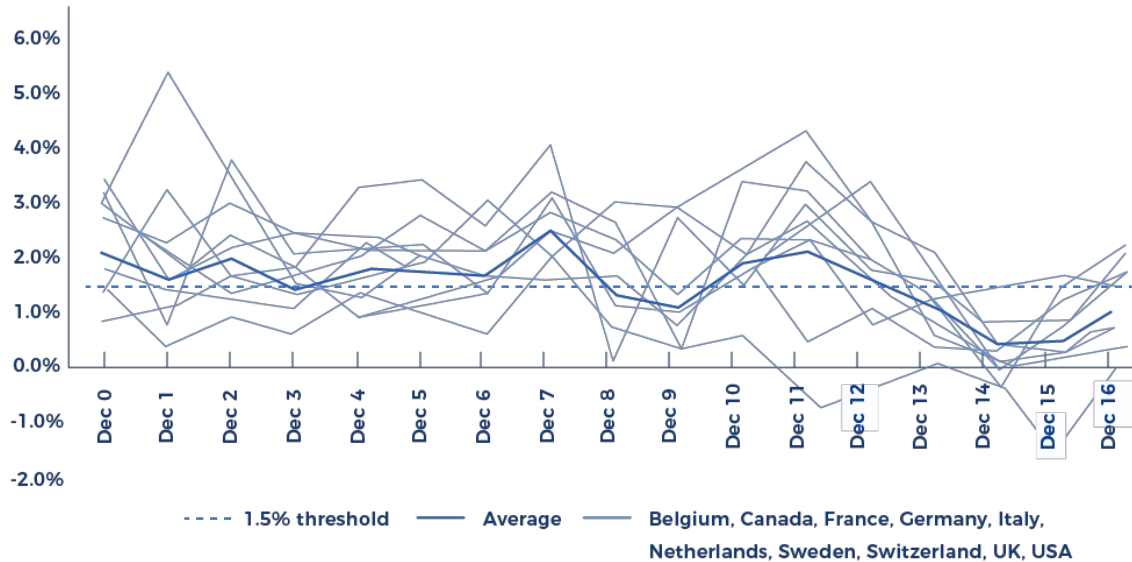


As a barometer of healthy money, the world's best economies have average annual inflation rates below 1.5% in the recent past, which is well below historical averages. If the United States is used as an example, the target rate for inflation is 2-3%. Governments' and central banks' control (and in many instances lack thereof) of interest rates have caused massive bubbles and distortions in the real economy. ²¹

²¹ <http://www.johnbudden.com/wp-content/uploads/2012/09/ltassetreturnstudy2.pdf>

In economic terms, low to zero inflation is a sign of healthy money because the value of the currency does not fluctuate significantly and is therefore reliable. However, in a country like Argentina, the annual inflation rate is currently in the double digits today.²²

INFLATION FOR G10 COUNTRIES: 2000 - 2007



Going forward there are tremendous concerns as to what would happen in another financial crisis. There is less political will for central banks to bail out the economy. As debts continue to rise, there are also far less monetary tools to use to stimulate economic growth. As interest rates continue to rise it seems difficult to imagine how western economies, saddled with higher levels of debt, will manage to continue paying ever higher levels of interest without tipping back into recession.²³

The Ongoing De-dollarization Trend

Russia and China are quickly moving towards what may be substantially complete currency related independence from Western economies, thereby attempting to challenge the reserve currency status of the USD. There has been an increasing rate of purely bilateral economic and trade agreements between Russia and China (as well as members of BRICS & Emerging Markets (EM) An example of this is economic cooperation between Russia and China in which federal regulators of the two countries agreed to issue home currency-denominated bonds in each other's markets and looking to phase in a gold standard of trade as well.²⁴ China has also initiated the Belt and Road Initiative which is a development strategy between Eurasia, Southeast Asia, the Arabian Peninsula and Africa for economic cooperation whereby Western nations have been left out.²⁵

As more countries move away from settling in USD this will certainly open the way for alternative monetary systems or currencies to replace the old one.

²² <https://tradingeconomics.com/argentina/inflation-cpi>

²³ This happened on three separate occasions in Japan after the crash of the Nikkei in 1989.

²⁴ <https://www.scmp.com/news/china/diplomacy-defence/article/2079648/russian-central-bank-opens-first-overseas-office>

²⁵ https://en.wikipedia.org/wiki/Belt_and_Road_Initiative

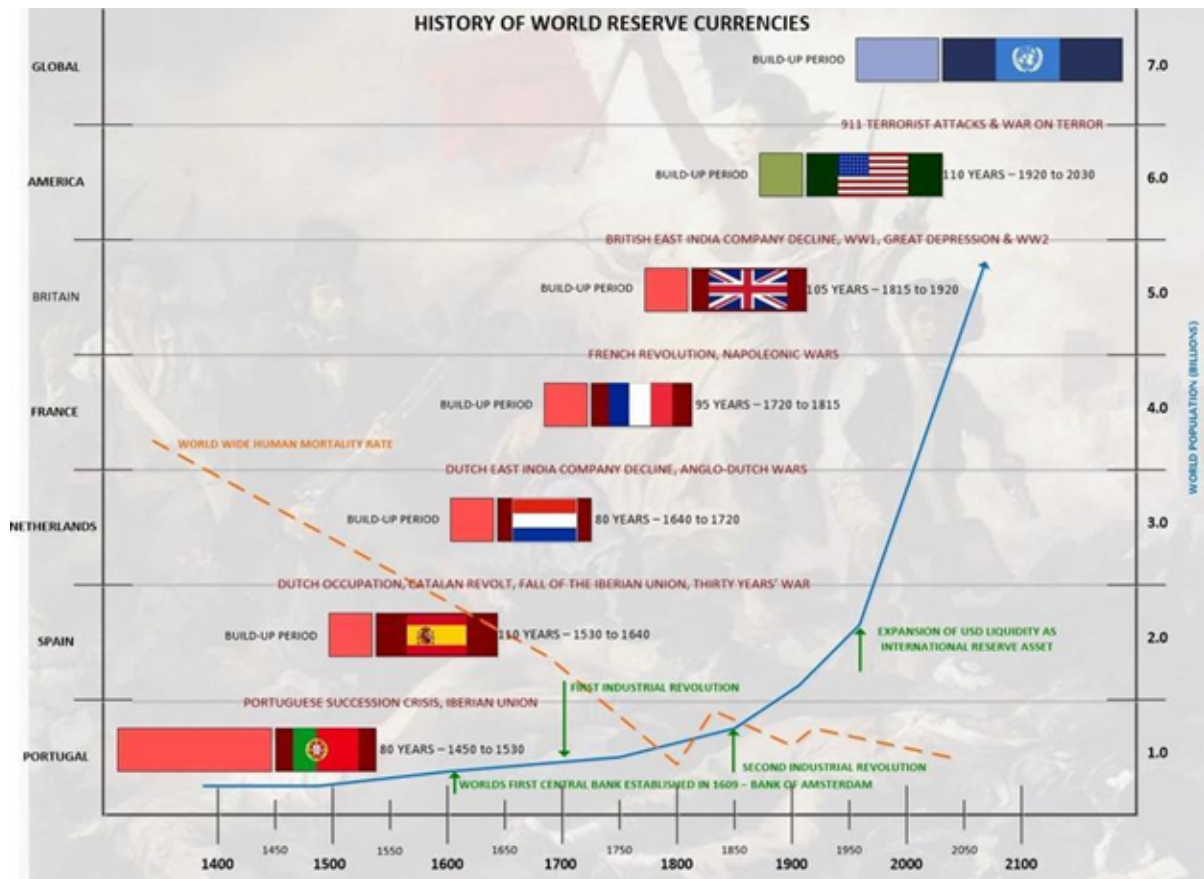
Furthermore, as China surpassed the U.S. as top oil importer in 2018, it is reportedly planning to launch a pilot program to pay for oil in its own RMB. Regulators have asked several financial institutions to prepare to price oil imports in RMB. In addition, China recently began trading oil futures in its own currency.²⁶

So what can be done to finally solve the issue of currency stability? Nobel laureate scholar, John Nash, proposed the idea of “Sound Money” to try to solve some of these issues. His “Sound Money” thesis proposed that international exchange rates be fixed by pegging the value of each currency to a standardized basket of commodities, called the “industrial consumption price index.” Such a policy would curtail the ability of central banks to make monetary policy. Nash believed his system would be more stable and sustainable than the gold standard because exchange rates would not be seriously affected by fluctuations in any one commodity.

At the same time, no matter what money system has been tried, whether it’s the gold standard or currency substitution with the creation of the Euro, nothing has seemed to solve the issue of the Trilemma. Let’s refresh what it is again. Essentially, the Trilemma says governments can only choose 2 of the 3 below:

1. Full freedom of cross-border capital movements
2. A fixed exchange rate
3. An independent monetary policy oriented towards domestic objectives

Recently due to a combination of computing power, artificial intelligence, the use of algorithms, and blockchain a new solution has emerged- a stable cryptocurrency. These proposed mechanisms promise an upgrade to manage monetary policy in a digital world.



Source: Zerohedge

²⁶<https://www.forbes.com/sites/sarahsu/2018/04/05/the-almighty-dollar-is-us-dominance-in-the-oil-trade-waning-as-china-begins-using-rmb-for-payment/#edca0fbc875>

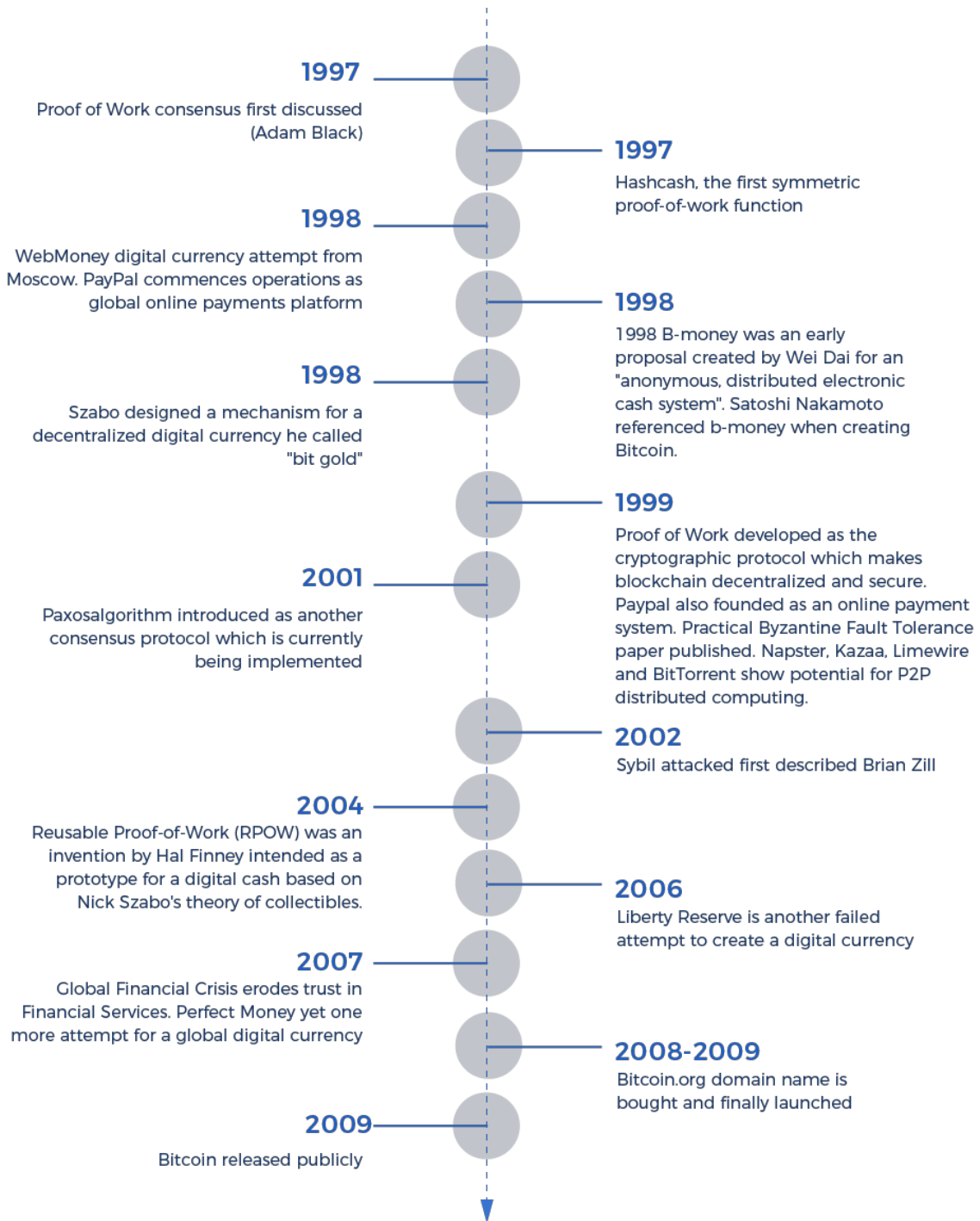
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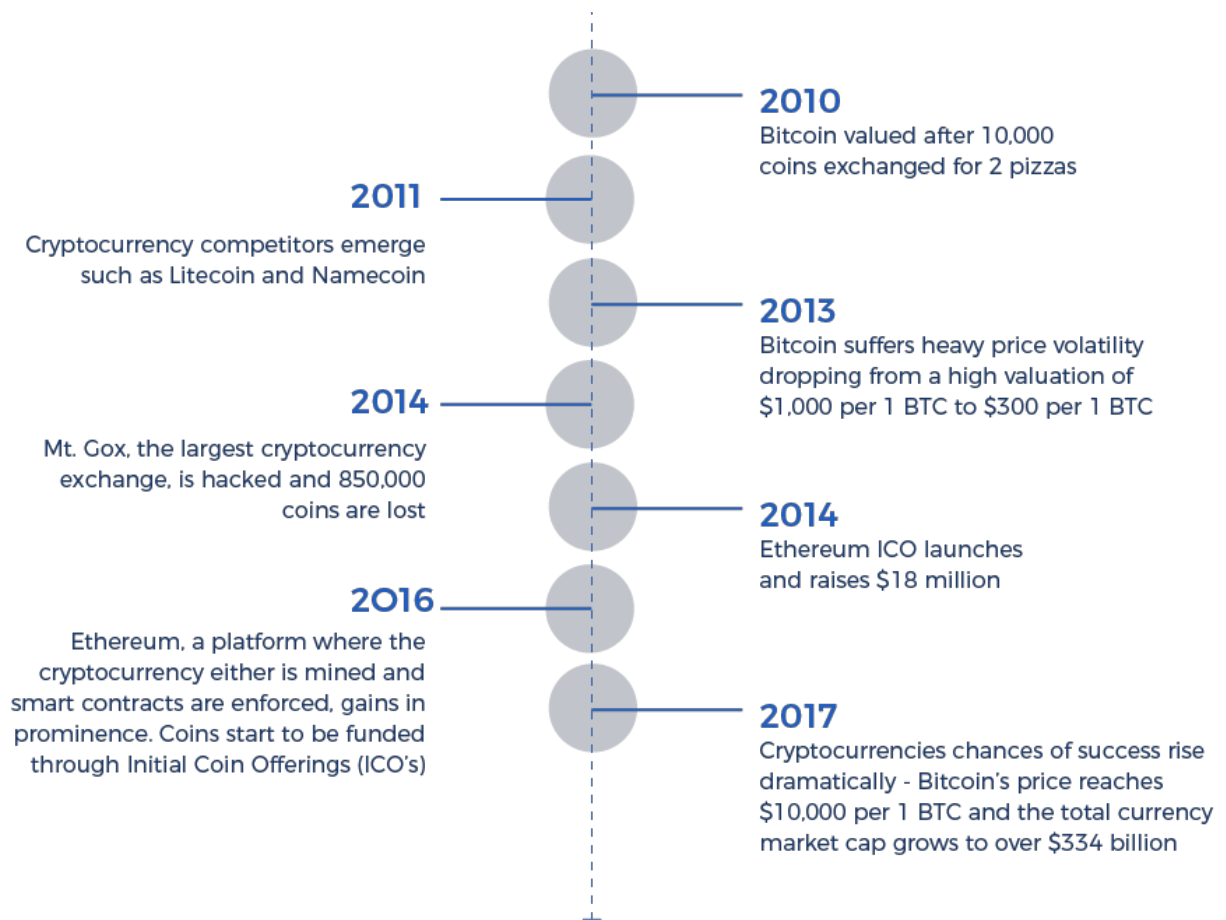
“The medium of money has only changed a few times in history, from precious metals to bearer currencies to now our ledger-based electronic systems. Bitcoin and blockchain represent a transition to a new medium. This transition is often referred to as distributed ledger technology....But I find it more helpful to look back to bearer instruments, like banknotes, to appreciate what this new medium enables: a digital bearer instrument.”

–Adam Ludwin, CEO of the blockchain company Chain

The rise of Bitcoin

While cryptocurrencies were publicly operationalized with the release of Bitcoin in 2009, there was a long history of theoretical and practical developments (starting from 1962) in distributed computing, cryptography and digital money which needed to emerge and ultimately converge to provide the technological foundation for cryptocurrencies to flourish.





The emergence of Bitcoin and cryptocurrencies has shown that there is a potential path away from centralized and anti-competitive fiat monies that are managed and issued by a government and their associated central bank. This path has been towards a decentralized form of money. Cryptocurrencies are called “decentralized” because they are not owned by any government or issued by a central authority, making them censorship resistant: no individual, group, or state-based actor can prevent the operation of a cryptocurrency network. The technology allows parties who don’t know and don’t need to trust each other the ability to transact together. Trusted intermediaries are not required to keep custody of assets or ensure transactions take place correctly. There is a shift in where we place trust.

Multiplicity of cryptocurrencies

Another major feature of the crypto-economy is the diversity of cryptocurrencies, which have expanded from just Bitcoin in 2009 to, according to CoinMarketCap.com, 1935²⁷ actively-traded cryptocurrencies. This multiplicity of cryptocurrencies enables them to function as complementary currencies or charter currencies (definitions below), and as such, they can begin to fulfill the roles that fiat monies have failed to fill or simply cannot fill. It also allows users to diversify their holdings into other assets, choose the monetary framework which is most competitive or most suits their ethics and which facilitates economic development in a way which fiat monies cannot compete with, or cannot perform at that moment.

²⁷ There are likely tens of thousands of crypto assets in existence that circulate in some way or another. CMC lists those for which trading records exist.

Cryptocurrencies operate like charter currencies. Charter currencies do not need a government to verify acceptance - only vendors using them need to accept it, and their monetary policy is defined by a private institution, similar to fiat currencies, except that fiat currencies are regulated by a public institution, usually a central bank. As Andy Bromberg [highlights](https://medium.com/@andy_bromberg/charter-currencies-designing-a-future-of-competitive-monetary-policy-ce100f010fe), “a charter currency often comes with an initial use case: spending at the institution that manages it.”²⁸ Charter currencies are built on the availability of a currency needed for transactions from an issuing authority, a charter to govern the monetary policy of this currency and the freedom for users to move between different charter currencies and fiat currencies. The combination of availability, a charter, and the freedom of participation creates a competitive monetary policy framework, where users choose currencies based on their perceived quality of the monetary policy, prompting currencies to compete with each other based on the features and benefits of their particular monetary model. The value of charter currencies in relation to a fiat currency as a benchmark, let's say the US Dollar, is a function of the following variables: its acceptance as a medium of exchange in transactions, the quality of the monetary policy governing it and the trust accorded to the institution which issues it. The appeal of charter currencies is found in Bromberg's analysis, as he is keen to stress that charter currencies bypass the high cost of changing citizenships to use currencies since they allow users to switch between currencies while still maintaining their current domicile. Users can find a constant equilibrium between keeping some portion of their cash in governmental currency and the rest in the charter currencies which they prefer at any given moment. Thus, if users dislike the policies or ethics of their government, they can use cryptocurrencies as charter currencies, picking those with what they believe to be the best monetary policy, and completely or partially exiting fiat monies without having to stay silent, raise dissent (which rarely affects change) or having to painfully renounce their citizenship. Holding alternative currencies then becomes an expression of values.

By acting as an alternative form of money (i.e. a medium of exchange, store of value and unit of account etc.) cryptocurrencies can become an outlet of economic resilience for communities in the face of volatile national currencies. Furthermore, cryptocurrencies spur financial inclusion, allowing previously unbanked or underbanked groups to use financial instruments for a range of needs, most importantly, accessing capital for small business growth or for emergencies. Here, Complementary currencies (CCs) fulfill a role that national currencies cannot and can be precisely deployed to catalyze region-specific or project-specific development, potentially encouraging the use of underutilized local resources and production in underdeveloped regions. CCs can also recognize an informal economy, allowing merchants to gain greater credibility and customers.

²⁸ https://medium.com/@andy_bromberg/charter-currencies-designing-a-future-of-competitive-monetary-policy-ce100f010fe

HISTORY OF MODERN ERA CURRENCIES



*29

²⁹ Barcelona has recently launched a Blockchain currency to promote and incentivize local trade starting with €1.5 million of Recurso Económico Ciudadano. <https://www.trustnodes.com/2018/10/04/barcelona-launches-blockchain-currency>

Section 3 - Stablecoins

Stablecoins – an evolution of tokens that attempt to solve the issues in section 1

"[Stablecoins] are the first step before you actually see anything else interesting happening. I would argue that the reason why the blockchain world is so vapor-wary... is basically because you just cannot do business in an unstable environment."

--Rune Christensen, founder of MakerDAO

*"For a global, fiat-free, digital cash, the total addressable market (TAM) is that of all the money in the world: ~\$90T. The opportunity for stablecoins is, intrinsically, the largest possible TAM. This vision is larger than that of Bitcoin itself. A fiat-free currency that's price stable will challenge the legitimacy of weak governments around the world."*³⁰

Stablecoins are digital tokens which are price-stabilized. Often this is done by pegging to another asset or benchmark like the US Dollar. It is not Central Bank issued and has low-volatility. This measure aims to provide them with stability as a unit of account and measure of value, given that currencies like Bitcoin have been plagued with price fluctuations of more than 20% in a single day. Stablecoins create connections between the legacy world and the blockchain. Thus, the raison d'être of stablecoins is to mitigate and solve price volatility which has so pervasively characterized cryptocurrencies while attempting to retain other characteristics of bitcoin such as the free flow of capital and censorship resistance.

This price volatility has dissuaded customers, investors, and merchants from adopting cryptocurrencies, since it adds uncertainty as a static store of value, and fluctuates too much to be useful as a unit of account. As a result, cryptocurrencies have not become more widely adopted and according to Haseeb Qureshi, General Partner at MetaStable Capital, "cryptocurrency volatility also precludes blockchain-based loans, derivatives, prediction markets, and other longer-term smart contracts that require price stability³¹."

Major companies are now seeing the value of stablecoins and developing their own cryptocurrencies. Facebook is working on a stablecoin that will allow users to transfer money on their messaging app Whatsapp. The first use case looks to be remittance in India. This stablecoin will be fiat-backed and pegged to the U.S. Dollar so as to minimize volatility.³² JP Morgan has issued the first bank backed digital token called "JPM Coin" which will be used to instantly settle transactions between clients in their wholesale banking business.³³

³⁰ <https://multicoin.capital/2018/01/17/an-overview-of-stablecoins/> - of course, stability can be relative.

³¹ <https://hackernoon.com/stablecoins-designing-a-price-stable-cryptocurrency-6bf24e2689e5>

³² <https://www.bloomberg.com/news/articles/2018-12-21/facebook-is-said-to-develop-stablecoin-for-whatsapp-transfers>

³³ <https://www.cnbc.com/2019/02/13/jp-morgan-is-rolling-out-the-first-us-bank-backed-cryptocurrency-to-transform-payments-.html>

In the same vein, Bill Barhydt, founder and CEO of Abra, a cryptocurrency wallet company, outlined the market expansion that stablecoins could spur:

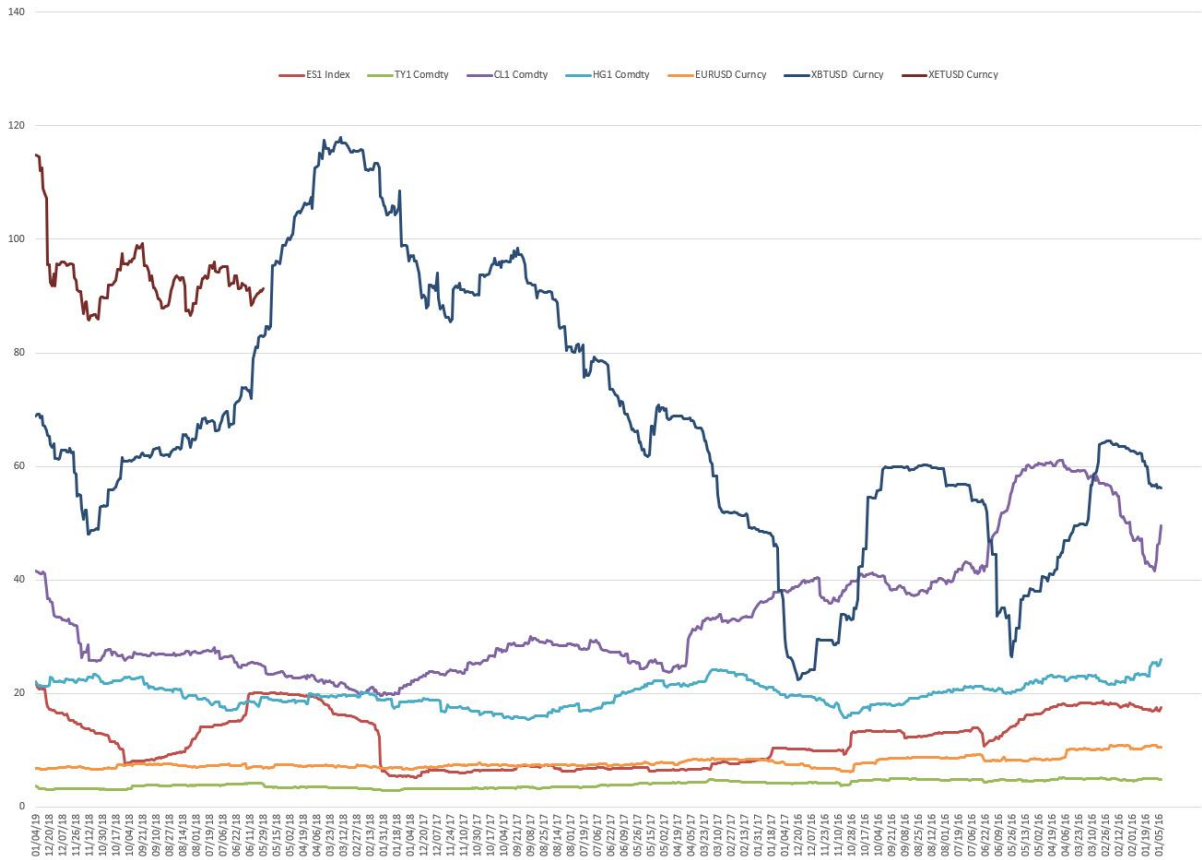
“... stablecoins will have a role to play in broadening cryptocurrency markets. In my mind, the most promising and often overlooked application for stablecoins is their utility as on-ramps for assets moving from traditional financial markets into crypto... instead of thinking of stablecoins as some kind of giant ballast that will keep the crypto ship steady, think of them instead as a port – a place for people to load and unload assets...”

...Ultimately, I think that stablecoins will play an important role in bridging traditional financial markets with the emerging, programmable financial tools enabled by cryptocurrencies. Reducing the friction between the crypto and fiat financial systems will help increase access to new kinds of assets and opportunities, which is critical for projects and companies currently building in the crypto space.”

Essentially, legacy payment rails can link directly with stablecoins, usually via a wallet mechanism, which can allow for everyday transactions, e-commerce and even crypto-investing, where investors can buy crypto-assets pegged to shares of companies, bonds, real estate, commodities, and collectibles.

Why end users need stability

The biggest barriers to adoption of cryptocurrencies as a medium of exchange and as a store of value are price volatility from speculation and the lack of perceived advantages over traditional payment systems that work very well for the majority of consumers in developed economies. The volatility in fiat and cryptocurrencies have been caused because they are not backed by anything except the “full faith of a government” or the utility of a network. Most cryptocurrencies have been proven to be illiquid. Stablecoins can help to get cryptocurrencies to exist at some sort of equilibrium. While fiat currencies and other asset classes are not completely risk-free, the volatility in cryptocurrencies is noticeably higher, as is the exposure to a Black Swan event; i.e. a highly improbable event of high magnitude whose occurrence was incomputable in the model and which leads to massive wins/losses. For context, the figure below shows how Bitcoin and Ethereum compare with the S&P 500, 10-year bond, commodities (West Texas Crude and copper) and the Euro in terms of volatility going back to 2016:



3435

Note: The time series is the rolling 1 month volatility of different asset classes. The most recent date is on the left hand side of the chart going backwards for visual effect. As one can see ETH and BTC display the highest volatility by far.

Why Bitcoin and other cryptocurrencies have not received mass adoption

Despite all the advantages of Bitcoin and other finite supply cryptocurrencies, mass adoption has not been achieved in finance and commerce. Typical arguments as to why it has not happened yet include:

Slow and expensive to use. With the introduction of Lightning Network³⁶, this issue may now be largely resolved. Many other cryptocurrencies appear to have also resolved this issue.

Time for adoption. Bitcoin has existed since 2009, and even if we start counting from 2013 (the first Bitcoin bubble and arguably the first introduction of Bitcoin into the collective consciousness), it is longer than PayPal had to conquer e-commerce and the online transaction market. Moreover, PayPal marketing campaigns raised less awareness than Bitcoin’s news coverage.

³⁴ Chart from Bloomberg correlation matrix at end of report.

³⁵ Chart from Bloomberg correlation matrix at end of report.

³⁶ The Lightning network creates a layer on top of bitcoin (aka second layer solution), enabling fast and cheap transactions which can net settle to the bitcoin blockchain. <https://www.coindesk.com/information/what-is-the-lightning-network>

Security. There are some risks of permanently losing funds due to cryptographic key mismanagement, but overall for consumers, cryptocurrency is similar to other online payment systems or credit cards. This is not necessarily true for business when we also consider security issues with multi-signature wallets most notably the parity multisig wallet hack; however³⁷, wallet and transaction security is improving **transaction immutability**. The introduction of decentralized escrow services has solved this problem.

Recalling that the main functions of money include:

- Medium of exchange.
- Unit of account.
- Store of value.

The value of Bitcoin has often experienced large fluctuations, rising over 178% a month, or losing 35% a week. We argue that these large price fluctuations make Bitcoin a suboptimal medium of exchange, unit of account or short-term store of value in comparison with fiat money, therefore, make it less preferable form of money for payments.

There are some companies including Microsoft, Overstock, Virgin Galactic and others which accept Bitcoin and other cryptocurrencies directly or via payment services such as BitPay. However, these companies do not keep their money in cryptocurrencies and immediately convert it back to fiat currency. This is primarily because these companies are not in the business of speculating on the price of cryptocurrencies. Companies have expenses to cover and do not want to carry any additional currency and volatility risk which also includes foreign exchange risk as well as Bitcoin price fluctuations. Some companies such as Steam platform, the largest digital distribution platform for PC gaming, stopped accepting Bitcoin due to volatility complications. In other words, Bitcoin does not serve as a good store of value for these companies.

Despite these issues, consumer demand drives what businesses are willing to accept as payment. If consumers want to use Bitcoin or other cryptocurrencies as payment, these businesses would certainly adapt despite the additional risks and complexities. However, Bitcoin and other cryptocurrencies face a significant challenge in gaining widespread adoption. Even people who are aware of Bitcoin and are comfortable with the technology mostly would prefer to make payments for everyday economic activity in fiat instead of Bitcoin because from one month to the next it is unclear if some fixed amount of Bitcoin will be enough income to cover household bills. So Bitcoin does not serve as a more preferable unit of account than the US dollar.

Furthermore, people often see Bitcoin as a vehicle for speculation. If they held Bitcoin they would, for instance, defer a purchase of headphones worth \$300 today and wait until Bitcoin rises in price relative to fiat, thereby reducing the cost of the headphones in Bitcoin. In this manner, Bitcoin's rising prices create an incentive not to spend. This incentive makes Bitcoin a less workable medium of exchange than fiat currencies with predictable purchasing power.

It is thought that that price volatility is the biggest barrier to entry for the widespread adoption of Bitcoin. Similarly, other cryptocurrencies also suffer from the same barrier to adoption due to their volatility.

³⁷ 150000 ETH or ~30 million USD was stolen from a wallet. <https://blog.zeppelin.solutions/on-the-parity-wallet-multisig-hack-405a8c12e8f7>

MUST HAVE FEATURES OF DIFFERENT STABLECOINS



STABILITY

Does it have price stability feature?



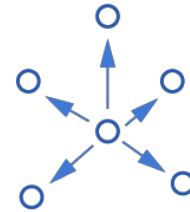
SCALABILITY

Payments settle in few seconds?



PRIVACY

Does it offer anonymity and fungability?



DECENTRALIZATION

Free from central authorities or major stakeholders?

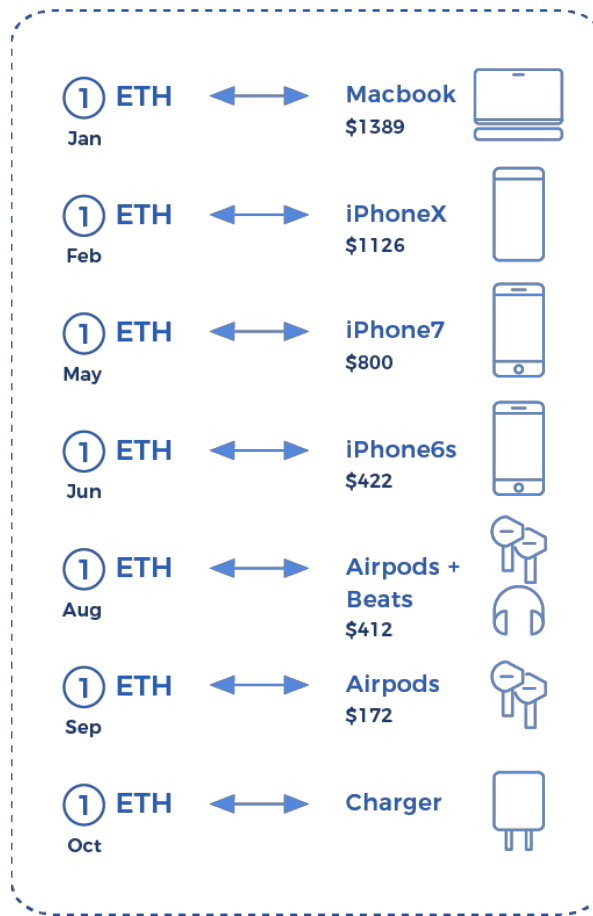
Eventual stabilization of Bitcoin

Will Bitcoin eventually grow less volatile?

While volatility will decrease with greater adoption, it is unknown whether price fluctuations will ever be less than that which occur in large-cap stocks such as Google or gold. (see chart below) In case the price eventually did stabilize it would likely imply that it was performing poorly as a growth investment, therefore possibly creating a new sell-off cycle introducing renewed volatility. We are starting to see stablecoins maintain their pegs through very volatile times (Maker held its peg through the entire Ethereum down move)³⁸. This potentially bodes well for the future of Stablecoins.

³⁸ <https://medium.com/@mikeraymcdonald/single-collateral-dai-9-months-in-review-b9d9fbe45ab>

2018 ETH



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Problems associated with cryptocurrencies

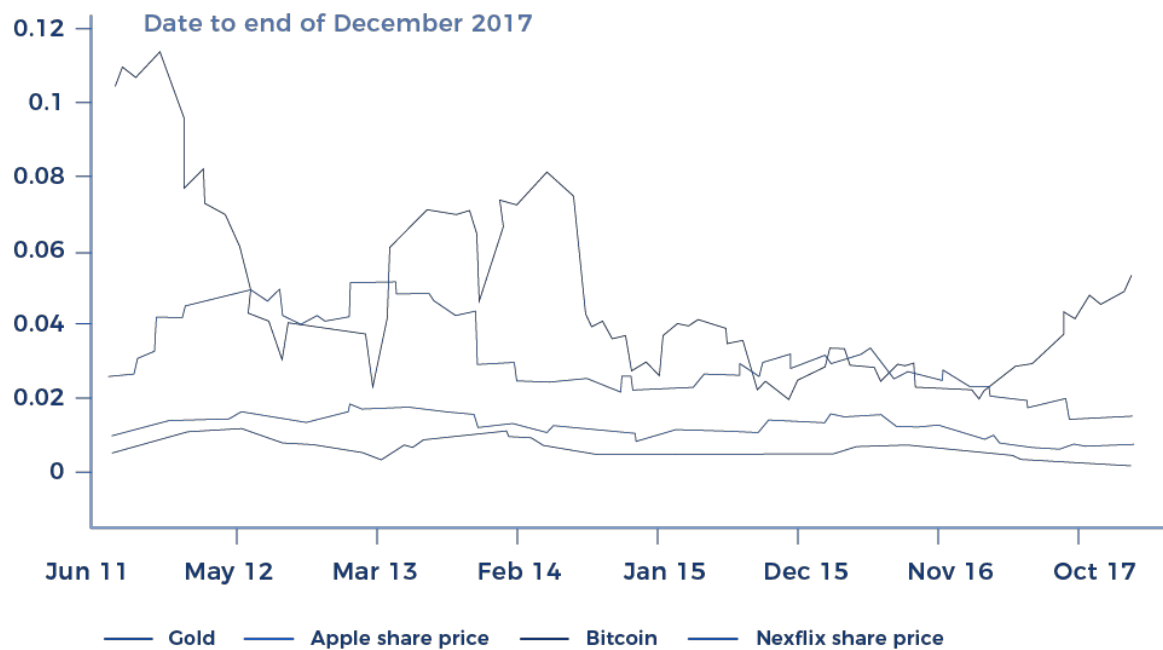
- Price Volatility
- Disparate and Unclear Global Regulation
- Lack of Custody Solutions
- Lack of Fiat Gateways
- Lack of Governance
- Concentration of Power (Centralization)
- Lack of Interoperability
- Poor User Experience
- Lack Of Scalability

³⁹ Internet meme from China

“A cryptocurrency economy is much like an emerging market. A cryptocurrency does not have coercive power to enforce demand for its currency (for now?) so it relies on external capital flows for demand. As with fiat currency, it is much easier to control supply rather than demand for a currency. Emerging markets offer parallels to the cryptocurrency economy and lessons in the hunt for the ever elusive stablecoin, which would be a safe harbor from the sometimes insane volatility of cryptocurrencies. Emerging markets lack sufficient taxation power due to a combination of internal poverty and insufficient government power to enforce its writ. Their coins are unstable with dependence on external capital which is fleeting at the first sign of trouble. Capital flight leads to a sharp drop in currency value, causing further capital flight as the remaining foreign investors rush to protect their holdings from the declining currency. This destructive feedback loop of declining currency value is a fundamental problem with any currency system whether it is an emerging market currency or a cryptocurrency.”⁴⁰

HOW VOLATILE IS BITCOIN?

200-day standard deviation of bitcoin, gold, Apple shares and Netflix shares



41 42

⁴⁰ <https://medium.com/@sjha1984/lessons-for-cryptocurrencies-from-emerging-markets-abeabf53177c>

⁴¹ Image taken from “Why Bitcoin Needs Fiat (And This Won’t Change in 2018)” by Tim Swanson. Published January 3rd, 2018.

⁴² <https://diar.co/volume-2-issue-43/>

A Word About Smart Contracts

Cryptocurrencies pioneered the ability for ledger-appending transactions to be conducted correctly without having to trust a central intermediating party. This has major implications for every industry that involves middlemen, but the financial sector is the beachhead. The next area that is now being affected is computation: previously, in order to run a program, one had to trust the server or computer running the program. A network called Ethereum pioneered the concept of Smart Contracts⁴³. These Smart contracts are computer programs that are verifiably executed correctly across a decentralized network where there is no single trusted computer or intermediary required. This opens up a new set of possibilities. Algorithmic automation of monetary policy is the one that we will discuss in this report.

One then needn't trust that a particular government or central bank will faithfully enact the monetary policies committed to: here, if a particular set of actions are written into the smart contract, they will be faithfully executed. This is why crypto-collateralized stablecoins are in a different category from traditional collateralization. There is no way to trustlessly automate the auditing, redemption, and price-stabilizing actions of assets held in traditional financial institutions. Crypto-assets are fully programmable money. However, there is the bootstrapping issue: all of the assets known to be price-stable are currently only represented in the traditional financial system. So some of the vanguard projects we describe here involve tokenizing physical assets beginning with gold. A stable backing asset on a blockchain can be programmed via a smart contract to act as a reserve to itself stabilize the value of a token.

This benefit of being backed by verifiable algorithms is all the more relevant for non-collateralized instruments purporting to be stable. Previously, the only factor to consider in whether a non-backed (fiat) currency would retain value was trust in the issuing entity ("the full faith and credit"), usually a government's central bank, and to some degree their ability to force the use of their currency, e.g. in paying taxes. Now, even if a cryptocurrency has little or no reserves, one can audit and verify the actions that will be taken by that smart contract to stabilize its value. Some of the seigniorage models rely on holders of their share token to take part in further speculation on the future growth of the token by buying and contracting the supply. In practice, some degree of reserves will most likely go a long way towards solidifying public opinion in the desired direction for a token to maintain a longer-term presence and stability.

There are a number of moving parts in stabilizing a currency system and any complex piece of software can fail or have bugs. By the same token, knowing the way a currency system will respond to events opens up the possibility of hacking the currency for profits, which could heighten volatility past its breaking point and cause the demise of a token. However, the promise of this area of endeavor is extraordinary and there are more than a handful of companies who are making a play in this area. We have yet to see whether the above requirement of "uniformity" for a successful currency still holds true or if there will be a place for many different kinds of stablecoins in this new, decentralized world.

Oracles

Blockchains and smart contract programs do not have any way to interact with the outside world. However, in order to stabilize the price, usually, the price of the asset needs to be known. So there is the concept of an oracle, a trusted system outside the smart contract that is relied upon to input correct data into the smart contract, in this case, pricing data from relevant currency exchanges.

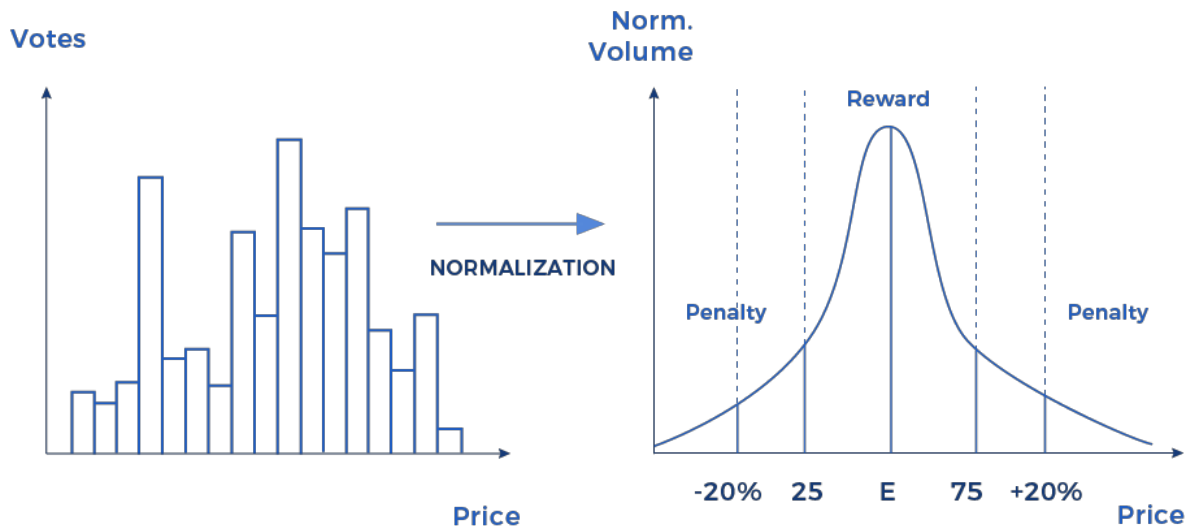
There are several approaches to implementing an oracle. They are ranging from

1) a centralized solution, such as the underlying corporation simply running a server

⁴³ Ethereum was the first implementation however Nick Szabo coined the term in the late 90s: <https://nakamotoinstitute.org/formalizing-securing-relationships/>

2) a semi-decentralized solution, where different agents run price feeds and decentralized governance decides which data-providers to include

3) a fully decentralized solution, a public betting mechanism (also known as a Schelling-point contest) where statistical outliers are penalized and correct results are incentivized. These are important in this case for stablecoins to maintain their peg.⁴⁴



Currencies are often “backed” by holding reserves of an underlying asset in the creation of a currency, or symbolic token, representing that collateral. There is usually a defined method of redemption of the token for the underlying asset. It is generally easier to allow a professional service to hold hard assets and so redemption rates became low as trust in banks increased, and it was realized that a full reserve of the underlying asset wasn’t necessary to keep on hand at all times. Thus fractional-reserve banking was born.

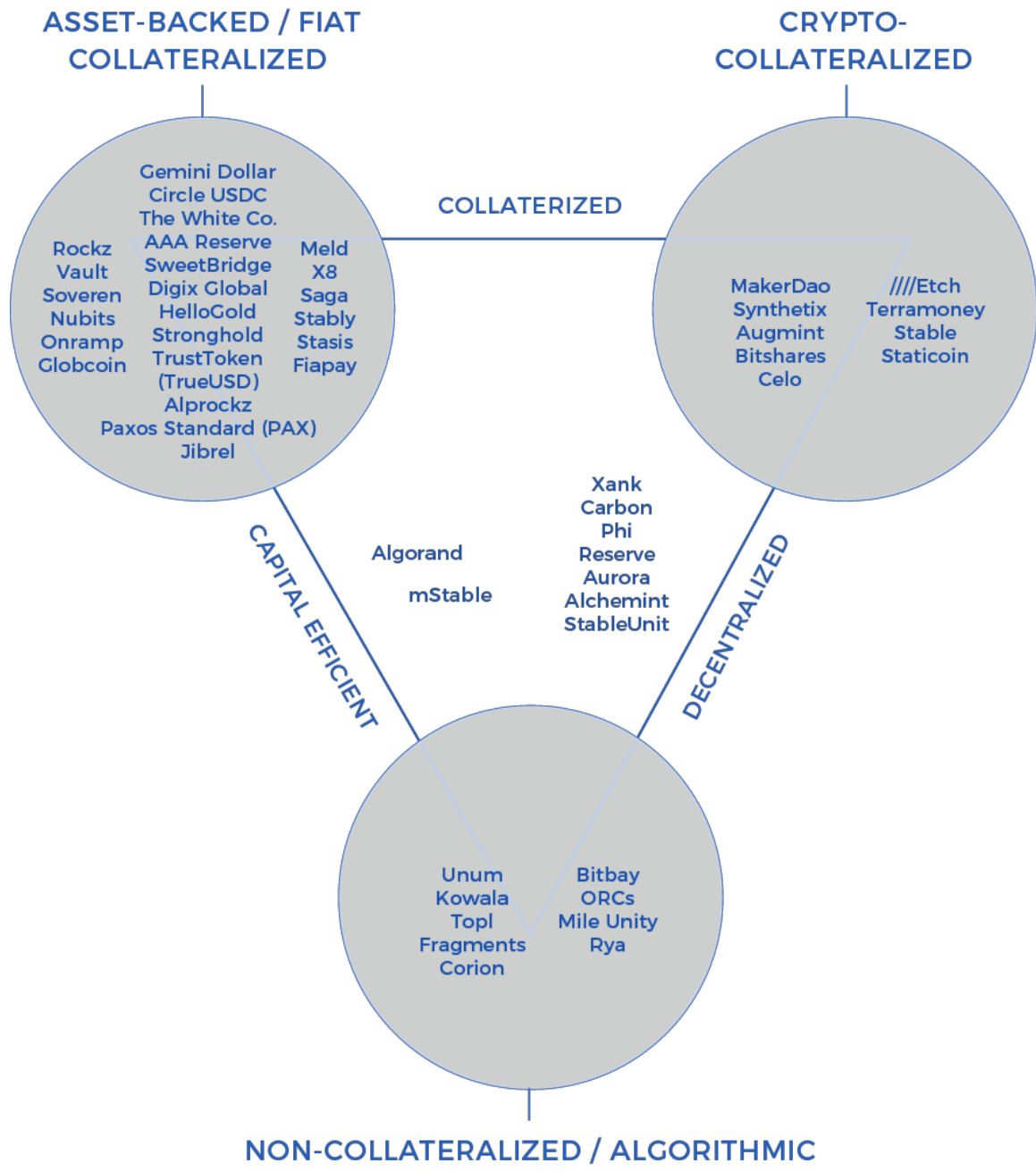
As this evolved towards fiat, literally “willed into being”, currencies in which there is no hard asset that it represents, new methods of stabilization were developed. Keynesian thought put forward the notion that the value of a currency could be managed by controlling the quantity of circulating supply of that currency. Lowering value by increasing supply is easy through minting. Reducing the supply mainly involved incentivizing long-term investors to hold the currency by offering bonds or utilizing bank-held reserves of foreign currency to buy its own currency off the market.

In the world of Stablecoins, all of the major types of currency stabilization are represented in various products, with some unique twists made possible by the trust-minimizing decentralized protocols that these currencies rely upon for their operation. The simplest and most common stablecoin design is full collateralization.

The Impossible Trilemma for Stablecoins

Stablecoins, as they exist today, have their own impossible Trilemma (you can only have 2 of 3 when building the project). The three sides consist of 1) Collateralization 2) Decentralization and 3) Capital Efficiency. Moving around the triangle as the diagram below shows will allow a project to fit into one of the three stablecoin categories: Fiat/Asset Backed, On Chain Crypto Collateralized or Seigniorage based.

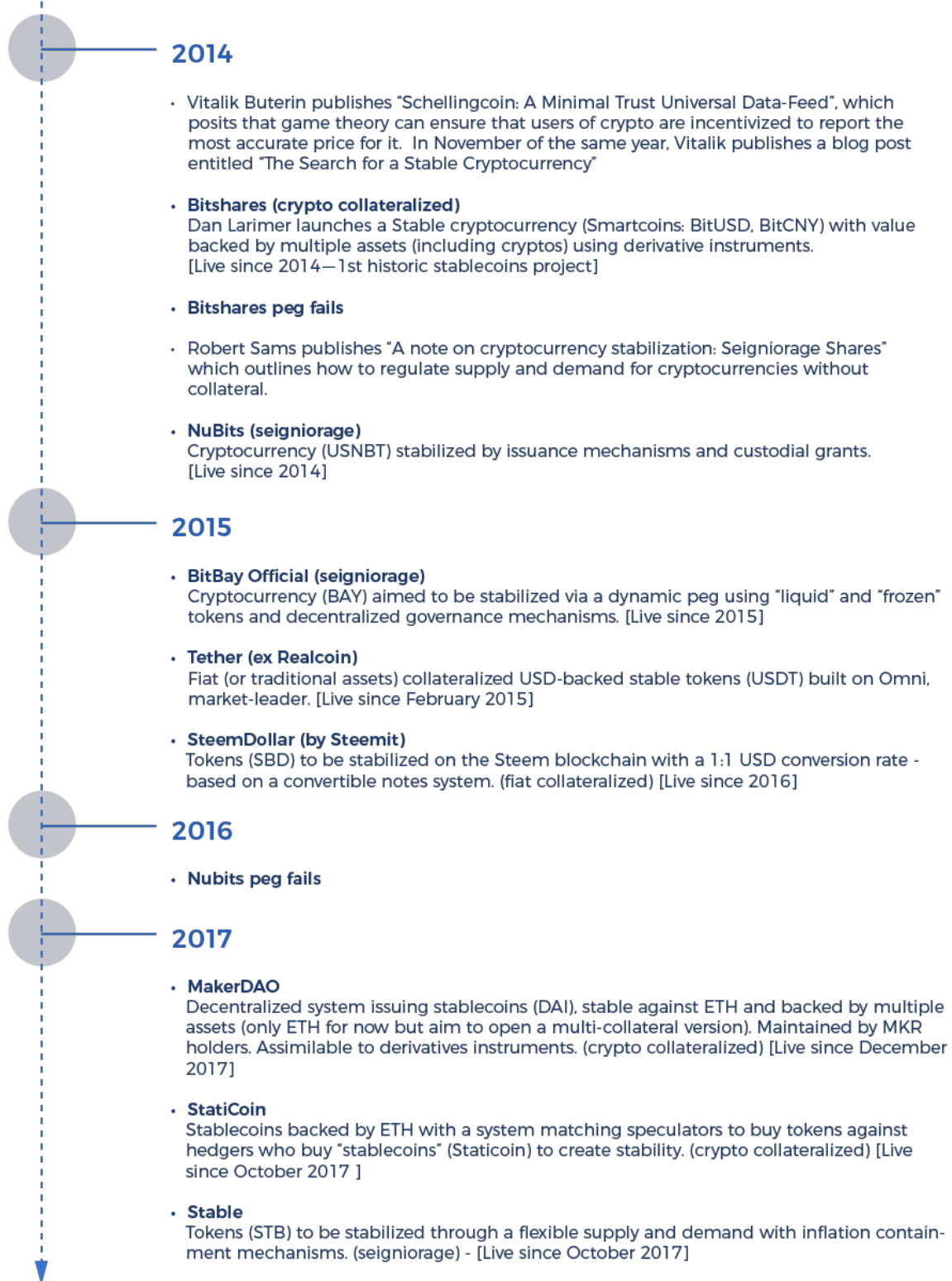
⁴⁴ <https://blog.ethereum.org/2014/03/28/schellingcoin-a-minimal-trust-universal-data-feed/>



*45

⁴⁵ <https://hackernoon.com/stablecoins-designing-a-price-stable-cryptocurrency-6bf24e2689e5>.

Diagram of stablecoin progression





2018

- **TrueUSD (by TrustToken Team)**
USD-backed stable cryptocurrency (TUSD) focusing on transparency, built on Ethereum. [Live since March 2018] fiat (or traditional assets) collateralized
- **AAA Reserve**
Cryptocurrency (AAA) backed by cash, gilts and AAA-rated credit investments and stable against fiat currencies. Focus on large fiat amounts(>\$25k). fiat (or traditional assets) collateralized. [Live since January 2018]
- **Digix Gold Tokens**
Gold-Stable tokens (DGX).
1DGX = 1 gram of gold in a Singapore vault. fiat (or traditional assets) collateralized [Live since Q1 2018–1st crowdsale on the Ethereum blockchain in 2016, raised +465K Ether]
- **EURS (by Stasis)**
Fiat (or traditional assets) collateralized. Fiat-collateralized EIP-20 stable token backed by EUR, with verification streams, supported by STASIS. [Live since July 2018]
- **Synthetix**
Stablecoins (nUSD) backed by fees, a distributed collateral pool and issuance mechanisms (similar to seigniorage shares model—see 3). (crypto collateralized) [Live since June 2018]
- **Stably, Inc.**
Reserve-backed stablecoins (StableUSD) with a supply adjusted via open market operations. [Beta—Live since August 2018. Launch - November 2018] fiat (or traditional assets) collateralized.
- **Gemini Dollar and Paxos Standard (PAX)**
USD backed stablecoins both launch with NYDFS approval. September 2018 fiat (or traditional assets) collateralized.
- **Alchemint**
Stablecoins (SDUSD) built on top of NEO, backed by a pool of assets (fiats and cryptocurrencies). [Launch planned Q3 2018] (crypto collateralized)
- **Augmint**
Digital tokens (A-EUR, their € stable token) targeted to fiat currencies copycatting their mechanisms using stability reserves and smart contracts. (crypto collateralized) [Launch planned on Q3 2018 – Q2 2019]
- **Boreal (by aurora-dao)**
Stable crypto-assets (Boreals) backed by a combination of ether reserves, debt from loans, and dapp endorsement. (crypto collateralized).
- **Globcoin.io**
Stablecoins (GLX) pegged to a basket of fiat currencies held in custody. [Launch by the end of 2018]. Fiat (or traditional assets) collateralized. Launch TBD
- **Celo**
Stable tokens pegged to fiat currencies, backed by a diversified, overcollateralized, and auditable crypto-asset reserve. (crypto collateralized) [Launch TBD]



2018 CONT.

- **Reserve (by Reserve Research Team)**
Tokens stabilized by crypto-assets locked in a smart contract, “fully” decentralized. [Launch TBD] (crypto collateralized) (seigniorage). Hybrid
- **StableUnit**
Cryptocurrency stabilized by smart contract stabilization fund and multi-layer stabilization mechanism. The whole system is decentralized and governs via DAO. (crypto collateralized) (seigniorage) Hybrid. [Launch is planned on Q1 2019]
- **Sweetbridge**
On-chain collateral-backed stablecoins (Bridgecoins). [Launch TBD] (crypto collateralized)
- **Unum**
Stablecoins backed by multiple cryptocurrencies and simple reserve mechanisms. [Beta – Launch TBD] (crypto collateralized)
- **Jibrel (by Jibrel Network) fiat (or traditional assets) collateralized**
Stablecoins (jUSD, jEUR...) backed by a wide range of assets, built on the Ethereum blockchain. [Alpha—Launch TBD]
- **PHI (by dfinity-network) fiat (or traditional assets) collateralized**
IOU stablecoins (PHI) backed by loan collaterals maintained algorithmically. [Launch TBD]
- **Saga**
Asset-backed cryptocurrency (SGA) with a volatility taming mechanism based on fiat reserve held in regulated banks.. fiat (or traditional assets) collateralized [Launch expected by end of 2018]
- **Stronghold USD (by Stronghold & IBM)**
fiat (or traditional assets) collateralized. USD token backed by multiple fiat currencies based on the Stellar network, guaranteed by the Federal Deposit Insurance Corporation. [Launch TBD]
- **USD Coin (by Circle & CENTRE)**
fiat (or traditional assets) collateralized. Fiat tokens (USDC) for crypto payments and trading (using CENTRE, a framework for stablecoins project involving real-world asset reserves, issued by CENTRE network members and audited by CENTRE).
- **X8currency**
Stable cryptocurrency (X8X) backed by a basket of fiat currencies and physical gold reserve. [Launch TBD] fiat (or traditional assets) collateralized
- **Basis**
(ex Basecoin): To issue stablecoins via smart contracts acting as a central bank to inflate and deflate prices by issuing bonds. (seigniorage). [Launch TBD]
- **Carbon**
Cryptocurrency monitored (Carbon) by an elastic supply through market participants, powered by EOS. (seigniorage)

2018 CONT.

- **Mile Unity**
Launches algorithmic stablecoin backed by Special Drawing Rights (SDR)
- **Corion**
Cryptocurrency whose price is maintained by an automated inflation/deflation control.
[Beta – launch TBD] (seigniorage)
- **Fragments**
Stable (low-volatility) tokens (USD Fragment) with an auditable reserve and monetary supply policy.
[Launch TBD] (seigniorage)
- **Kowala (by Kowala Tech)**
Cryptocurrency (kCoin) to be stable against fiats, cryptos and other types of assets maintained with algorithms and market-based oracles. (seigniorage)
[Live since September 2018]
- **Topl**
Stable cryptocurrency (Polys) backed by a basket of assets stabilized by the Topl foundation that issues and redeems tokens. (seigniorage)
[Launch TBD]
- **Soveren**
Shared RTGS infrastructure for central banks with frictionless payments and stable coin offering.
[Launch TBD]
- **Algorand**
Slated to launch early 2019
- **TerraMoney**
Cryptocurrency pegged to a basket of currencies (e.g. SDR) and assets with its value algorithmically stabilized; involves decentralized elastic supply mechanisms.
[Launch TBD] (seigniorage)
- **Basis**
Decides to shut down due to regulations which would have the stablecoin a security.
- **Bitshares**
BitUSD goes into global settlement as the peg fails.

IOU / Fiat-collateralized

Governmental-currency (Fiat) collateralized solutions are the easiest to implement. Fiat-collateralized solutions have a degree of centralization: only an individual or incorporated entity may open a bank account. This entity must be trusted to safeguard and maintain its collateral, as well as to keep any promises of token redemption. This presents a single attack vector: the company holding the assets backing the token, thus centralization.⁴⁶

If a stablecoin wishes to demonstrate trustworthiness, it would undergo regular public audits. This would need to be factored in as an additional operating cost. The following Stablecoins are based on an IOU/Fiat-collateralization model.

⁴⁶ In the case of Tether, this robustness looks very different, more like $R(\text{Tether}) = (m1..mn) * cr * (\text{HK_gov}) * (\text{US_gov}) * (\text{bank}) * (\text{team})$, so, if the core team fails to comply with US regulators - all Tethers in existence are doomed.

Tether (USDT)

The popular Bitfinex cryptocurrency exchange lost banking relationships and with it the ability to send wire transfers. Tether was acquired by Bitfinex in response to a loss of these relationships. This ushered in broader use of the Tether stablecoin for its USD trading pairs in 2015. Other major exchanges later followed suit. USDT is widely seen as an easy way to have exposure to hedge into a more stable asset without having to deal with the slow and cumbersome banking system.

CENTRE (USD Coin - USDC)

Circle and Coinbase have co-founded the CENTRE Consortium, a joint venture aimed at establishing a standard for fiat on the internet and providing a governance framework and network for the global, mainstream adoption of fiat stablecoins. The first major initiative from CENTRE is USD Coin, a stablecoin technology and network scheme. Circle became the first issuer of USDC just weeks ago and with this announcement, Coinbase is making it available to customers on Coinbase Pro and Coinbase.com. Customers can tokenize dollars into USDC and redeem USDC into dollars through both Circle and Coinbase, making USD Coin the industry's first open, fungible and interoperable fiat stablecoin.⁴⁷

Stably (StableUSD-USDS)

Stably operates much like the Tether IOU system with the addition of auditing, accountability and a focus on consumer usability. Stably launched on Ethereum first as an ERC-20⁴⁸. Next will be a Stellar anchor which issues StableUSD on the Stellar network. Users of Stably's platform will be able to view Stably's fiat reserve's balance in real-time via a live feed from Prime Trust's API. They plan on implementing cross-chain atomic swaps⁴⁹ of the token to be able to operate on multiple blockchains, in service of creating a single payment API to pay StableUSD to any decentralized application on any supported blockchain, be it Stellar, Ethereum, EOS or RChain.

TrustToken (TrueUSD TUSD)

An innovation of the TrustToken project is its clever use of trusts and escrows as a legal entity which can hold traditional assets, yet avoids complete centralization in terms of an intermediating individual who has arbitrary executive power over company assets. It has established a new type of legal trust which appoints beneficial ownership and control to a smart contract. By selecting the most decentralized corporate model available, it provides transparency and reliability to the extent possible within the legacy financial and legal systems.⁵⁰ It is a project that will be able to tokenize any asset, legally representing shared ownership and control of the asset. TrueUSD is the first asset-backed token from the TrustToken project, which utilizes the TrustToken protocol to tokenize its legal entity's holdings of USD.

Stronghold (Stronghold USD)

Another example of fiat collateralized cryptocurrency is Stronghold USD, which is a stablecoin created in collaboration between IBM and Stronghold, a financial services company. Stronghold will be the first venture-backed USD anchor on the Stellar network. An anchor is the on and off ramp for users of the token, exchanging USD deposited in their bank account for USD tokens. The collateral will be held at Nevada bank Prime Trust, which will deposit the funds across FDIC insured banks, up to the maximum insured deposit.

⁴⁷ <https://blog.circle.com/2018/10/23/coinbase-and-circle-co-found-the-centre-consortium/>

⁴⁸ This is the standard used to issue token via smart contracts on the Ethereum blockchain.

⁴⁹ Where two parties, own coins in separate cryptocurrencies, and want to exchange them without having to trust a third party.

⁵⁰ "Someday, governments may allow for direct legal representation by digital entities, eliminating the need for a human intermediary to open a bank account. Until then, we can take a practical hybrid approach by interfacing with escrow accounts, a part of modern legal infrastructure that already offers solid legal representation."

Stronghold USD is thus a digital claim on the dollars held by Prime Trust and is a big achievement in the stablecoin space because, for the first time, a cryptocurrency is (in an indirect way) federally insured by the FDIC and audited.⁵¹ This is an advantage over Tether which also issues tokens backed by US Dollars held in a bank but which is not audited or federally insured. According to [Coindesk](#), “the project represents one of several recent efforts to tokenize fiat currency in order to make transactions as fast and frictionless as crypto but without the volatility”, and is already being discussed as a technology to enable cross-border remittances and foreign exchange payments. Indeed, unlike Tether which is mainly seen as an arbitrage asset, Stronghold wants to facilitate more mainstream and transactional use cases

Fiapay

Fiapay issues a fully-collateralized Stellar asset, backed by the five constituent currencies of the Special Drawing Right (XDR). XDR is a unit of exchange of the International Monetary Fund (IMF) and has been in use since the late 1960's, primarily in settlements among central banks and the IMF. XDR is a basket (in fixed proportions) of five major global currencies (USD, EUR, JPY, GBP, and CNY).

Gemini (Gemini Dollar)

The Gemini dollar is a cryptographic token that is (i) issued by a New York trust company, (ii) strictly pegged 1:1 to the U.S. dollar, and (iii) built on the Ethereum network [1] according to the ERC20 standard for tokens.⁵²

Paxos Standard (PAX)

Paxos Standard (PAX) tokens are issued 1:1 against dollar deposits from customers, and are always redeemed 1:1 as well. Upon redemption, as dollars go back into circulation, the corresponding Paxos Standard (PAX) tokens are immediately destroyed. The tokens are only in existence while dollars are held in reserve.

Alprockz

Rockz is backed 1:1 versus the Swiss Franc. It is held 90% in physical money and 10% in bank accounts with Swiss financial institutions. Not only does ROCKZ offer a fully transparent asset-backed coin, backed against one of the strongest currencies in the world, but coin holders are protected in case of bankruptcy of the ROCKZ operating company. In such event, coin holders' claims against the ROCKZ operating company will be transferred to the vault operators and banks.

Soveren

Soveren is built as a utility service for central banks. The structure is designed to require no trust in any non-bank participating entity. The design allows one-off flexibility in relation to the reserve mix at the outset but then complete mechanistic operation thereafter. Reserves will be held by a UK investment structure operated by a bank. While it operates solely at the wholesale level a partnership with an accounting firm subsidiary provides the infrastructure for attached stablecoins.

⁵¹ For absence of doubt, while a bank account may be insured by the FDIC up to certain dollar limits (and with the understanding that, while the FDIC is an entity established by the U.S. Federal Government, being insured by the FDIC is not equivalent to insurance backed by the full faith and credit of the U.S. Federal Government), no cryptocurrency is directly insured by the FDIC or the U.S. Federal Government, and no auditing of any cryptocurrency is performed by the U.S. Federal Government (any auditing is performed by third party accounting firm(s)).

⁵² <https://gemini.com/wp-content/themes/gemini/assets/img/dollar/gemini-dollar-whitepaper.pdf>

Asset-Backed⁵³

Saga (SGA)

The Saga token begins life as a fully-collateralized representation of the SDR currency basket. It has provisions for the reserve ratio to decrease over time with specific market cap milestones as an indicator of public acceptance. It looks at a lower reserve backing as a larger backing by the 'intrinsic value' of the token. This allows a divergence of price from its SDR backing, at the expense of the price being influenced by the higher volatility of the intrinsic value.

Saga will be the first non-anonymous digital currency, with a formal KYC process for every participant. Saga balances the regulatory and personal accountability perspective, with the privacy of its participants by keeping the KYC information fully encrypted. Identities will be exposed solely upon a legal jurisdiction' warrant. This enables Saga to act as a cryptocurrency within the existing financial system.

X8 (X8 Currency/X8L)

ioNectar has developed software for professional portfolio risk management called "Automatic Reserve Management AI", designed to preserve the value of assets through varying market conditions. The X8C token is minted as funds are transferred into the corporate entity. Its reserves are split between the eight largest governmental currencies and gold; also, they utilize FIX and diversified across several banks and brokers. The token is essentially blockchain-as-a-service representing a portion of assets under management for X8's automated portfolio risk management software.

As with many of the other stablecoin projects, the stable token is not the subject of the token generation event fundraising sale. Instead, they have another token, X8X, which is a utility token representing a software sublicense for use of the ARM AI software (and by extension the X8C token itself), and is associated with passing a KYC check. Owning this token is a necessary precondition to transacting in X8C.

Digix Global (Digix/DGX)

Digix is tokenizing gold ownership. It utilizes a dual-token system to represent stake ownership in DigixDAO, the entity creating the tokens, and DGX, which is a fully-collateralized representation of vaulted gold. 1 DGX token is equal to 1 gram of gold. There are fees associated with DGX in order to facilitate their Proof of Asset protocol for Vendor, Auditor, and Custodian, which amounts to a 0.6% fee annually and a 0.13% transaction fee.

Digix has multiple pending partnerships with other projects that require a stable on-chain collateral, such as the Dai stablecoin, allowing gold itself as an asset to underlie and stabilize some of the algorithmic stablecoin projects.

Hellogold

Hellogold is a spin-off of the world's first Shariah compliant gold digital application, based on a dual-token system. HGT are tokens of the HelloGold foundation with no intrinsic value, while GOLDX tokens are the

⁵³ With cryptocurrencies backed or redeemable in precious metals or fiat currency, the ability to redeem may potentially be limited (i.e. in a 9-11 type scenario), or come with costs, or be less than seamless. For cryptocurrencies backed or redeemable in precious metals or fiat currency (even when facilities are regularly audited), there is always the chance that, were someone to try to redeem, that such redemption might complex, prevented or limited by applicable laws, or there might even be some shortfall (when costs and expenses are considered or otherwise) between assets on hand and outstanding coin.

stablecoins which are given to HGT holders and which are backed by gold assets. HelloGold aims to incentivize the adoption of blockchain technologies to spur financial inclusion by rewarding users with GOLDX tokens which are redeemable into gold.

Vault (USDVault)

Vault is a Swiss-Canadian company that leverages blockchain, legal infrastructure, and precious metals operational expertise to create institutional-grade precious metals backed stablecoins. The first token to be issued on the Vault platform is called USDVault. USDVault is the first stablecoin pegged 1:1 to the US Dollar, backed by and redeemable for gold stored in Swiss vaults.

SendGold

SendGold is a peer-to-peer gold ownership and payment gateway platform. The platform is fully-compliant, fully-liquid and is currently live in 10 countries including India and China. Customers of SendGold are outright individual owners of physical gold bullion stored in high-security vaults, audited by Bureau Veritas, and insured by Lloyd's of London. Gold-as-a-Service architecture is both channels- and chain-agnostic and SendGoldCoin (SGC) is the stablecoin offer.

Meld

Each coin is physically backed by 1g of gold bullion, fully stored and insured with secure vaulting facilities. The coins are also fully redeemable for the physical gold.

Stasis (EURS Token)

The Stasis project is creating a fully-collateralized digital version of the Euro. They stress the importance of auditing. They envision tokenizing any ISIN-listed security. Stasis is working with several governments on creating a blockchain-friendly legal framework for asset digitalization.

AAA Reserve (ARC-AAA Reserve Currency)

The Arc Reserve Currency, is a set of smart contracts and oracle web services operated by their corporate entity, Arc Fiduciary Ltd. The oracle reports current asset pricing, and bank balances and transfers. The smart contracts work in tandem with the oracle to mint tokens in direct proportion to the assets deposited via bank account, and the ability to buy back for cash. The value of ARC tokens is considered to be what their own contracts buy or sell it for, which is "net asset value per token"; the total value of reserve assets divided by the tokens in circulation; it is not pegged to a single external currency or basket. It aims to be both a stable store of value and a unit of measure. They simulate its value as increasing nominally over time; just above the USD inflation rate. Their definition of a stablecoin is telling:

A stablecoin is a cryptocurrency which is intended to have a relatively low volatility (relative to national currencies of developed countries) and has constant buying power in real terms (track inflation and therefore grow in nominal terms).

By maintaining a regularly-rebalanced basket of assets, and keeping a buffer account ready to ease any unforeseen market movements, they should be able to meet their goals of increasing net asset value per coin slowly over time as long as their investments and the markets they are based on remain sound.

Globcoin (GLX)

Globcoin is a collateralized token backed by a basket of the 15 largest currencies and 5% in gold. They also plan to offer a multi-currency prepaid MasterCard.

Sweetbridge (BRC)

Sweetbridge is a broad-based blockchain protocol stack which includes Bridgecoin, a stablecoin which is pegged to a currency or asset of the user's choice, thus it is fiat collateralized.

Jibrel (Jcash)

Jibrel has an interesting approach to asset-backed cryptocurrency design. They represent held assets with a "Crypto Depository Receipt", similar to Digix's digital certificate of held gold, except applicable to any asset type. They will concentrate on major currencies and two stable low-yield money market instruments, denoted by their symbol prefixed by a "j": jUSD, jEUR, etc. They aim to provide a decentralized platform where decentralized organizations and funds overexposed to digital assets can hedge their risks with tokens backed by real-world assets.

Rockz (RKZ)

Onramp (AUDramp)

OnRamp Technologies (Onramp) are working to provide investors and wealth management advisors with regulated and easy access to the cryptocurrency market via tokenized assets. They are the first Australian company launch an operational and compliant fiat backed stablecoin, AUDRamp; accessed through an ASIC registered managed investment scheme. Thereafter Onramp will be rapidly bringing to market a range of tokenized assets.

Crypto-collateralized

One of the most important aspects of cryptocurrencies is that all transactions are handled on a public ledger - everyone can see every transaction. The network is "pseudo-anonymous", meaning that the identity of the individual performing the transaction is not known by default. However, this correlation can be revealed. So for a smart contract which is managing on-chain reserves (reserves that are themselves crypto-assets) to stabilize a cryptocurrency, one can introspect not only into the source code which will automatically buy or sell the reserves but also sees the presence or absence of the reserves themselves on the blockchain. This opens up a new frontier of transparency: audits are no longer expensive processes with yet another intermediary to trust. Everything is available to be seen by anyone who knows how to look.

Cryptocurrencies, in general, are volatile. Although there are many benefits of holding collateral on a public ledger, a token which is pegged to a stable asset but collateralized with volatile cryptocurrencies is problematic. This brand of stablecoin must have some way to ride out inevitable instability.

BitShares (BitUSD)

Bitshares has multiple "SmartCoins", which are collateralized by redemption to BTS token. They guarantee that BitUSD etc. can be settled into BTS within one hour, minimum at the price of \$1.00 per token. It does this by choosing the least collateralized short position on their exchange and utilizing it to settle the

transaction.⁵⁴ Notably, they have no oracle as a source of external exchange pricing data and don't have any automation or smart contracts to adjust the price.

BitUSD has an overall very low issuance and liquidity. BitCNY is extremely popular in China. It has entirely replaced renminbi trading pairs on Chinese crypto exchanges due to strict regulation of fiat/crypto trading in the country. Many consider this to be an important early experiment in stablecoins, but overall limited.

MakerDAO (DAI)

MakerDAO's DAI has single collateral Dai which is collateralized by pooled Ether and multi-collateral DAI which is price stabilized against the value of the U.S. Dollar using a basket of crypto-assets as collateral. Its smart contracts allow any user to lock assets into a "Collateralized Debt Position", which locks the collateral and generates "dai", their USD-pegged stablecoin. The dai generated must be over-collateralized, which is capital-inefficient but provides reserve protection in the historically volatile cryptocurrency markets. Provided sufficient reserves and continued value of backing assets, it would not require the ongoing cost of public audits, since its reserves are publicly visible on Ethereum's ledger.

Collateral is in terms of PETH, "pooled ether". If a market crash occurs, the protocol includes the ability to dilute the PETH to recapitalize the system. In this case, the proportional claim of each PETH would go down.

Synthetic (formerly Havven)

Synthetic is a dual-token system, operating in a seigniorage style, but operating as a crypto-collateralized token pair. The share class tokens are called Synthetic Network Tokens (SNTs) in a crypto-collateralized fashion by issuing an ether-collateralized stablecoin, then later move to collateralizing via SNTs. The smart contract issues nomins and keep it to a minimum reserve ratio. The demand for SNTs is stimulated through distributing all nomin transaction fees to Synthetic holders. They vary the minimum reserve ratio (efficiency vs. resiliency) and the fee rate to incentivize the desired amount of nomins to be issued and circulating to stabilize its value. The fees Synthetic holders collect is dependent on the ratio of Synthetic Network Tokens locked for collateral vs. how many are free. Reducing one's collateralization ratio is accomplished by burning nomins, thus reducing the overall supply.

Terra Money (Terra)

Terra is a stablecoin which, like other Seigniorage Shares schemes, will algorithmically expand and contract coin supply to maintain coin price levels. It is pegged to a basket of fiat currencies. It seeks to build a mobile payment and e-commerce platform using Luna coins, its host cryptocurrency.

Unum

A stablecoin which is completely governed and managed via smart contract. When users sell other cryptocurrencies to the smart contract, it creates Unum tokens with a 1:1 peg to the value of USD. The smart contract looks up the current dollar value of the cryptocurrency on another smart contract known as the Price Oracle, which is constantly being updated with an average price of the cryptocurrencies it has in the Unum basket. Other tokens sold in this way are kept by the smart contract as a reserve. The project is relatively unknown partially because it did not engage in a pre-mine (minting initial tokens) or ICO; this also has the upside that there are no large holders of the token poised to create selling pressure on the token.

Augmint (A-Euro)

Augmint is a system for generating collateralized loans in tokenized versions of various forms of fiat, beginning with A-EUR, a tokenized Euro. They argue that markets are segmented, and generating a loan concentrates the token creation where the demand for that token is the highest, stabilizing the token value most efficiently. They also have a lock-up feature where a holder can elect to lock his tokens for a particular

⁵⁴ <https://bitshares.org/technology/price-stable-cryptocurrencies/>

period of time and receive a premium at the end of that period. The parameters for collateral pricing, loan generation, and the lock-up premium, are adjusted in order to incentivize most of the contraction or expansion which is needed. When instant price correction is required, Augmint itself will buy or sell with its own reserves.

Staticoin

Staticoin has a dual coin system, where StatiCoin is a coin which doesn't change in value, while RiskCoin absorbs the price delta in the Ethereum which acts as collateral for both coins. Users may "melt" coins at any time, reclaiming the collateral backing the coin. Some portion of every melting goes to holders of Riskcoins; the price of Riskcoins are set to alter the price of Staticoins to its peg. Due to the way price deltas are allocated between coins and the rules undergirding the coin, every time the value of RiskCoin goes to zero or is too highly leveraged with Ethereum collateral, no more Staticoins are created, created a sustainable reserve value for users of the coin.

////Etch (////Pier)

Participating blockchain companies who want to use ////Etch to pay out wages in real-time will stake their own native token within a basket of other ERC20 tokens in a smart contract that has the ability to "top up" with more tokens from feeder wallet to keep the stability. The price will be pegged to the UN FAO Food Price Index, or the Consumer Price Index.

Stable

STABLE is a project aiming to reduce the inefficiencies existing in digital tokens market and stabilize them, thus driving their much wider acceptance. The goal of the project is to stabilize the token markets and, at the same time, ensure a relative stability of the STB token value over time. Stable expects to deliver the annual volatility (variability) of project's net assets and therefore STB token price that is much lower (about 5-10 times lower) than that of other major digital tokens.

Seigniorage (Non-Collateralized/Algorithmic)

"[O]nce economies develop around the stablecoin itself, the peg will begin to matter less and less. If merchants are willing to hold and accept USD-pegged stablecoins, and they in turn pay their suppliers in the same stablecoin, and that stablecoin is widely used as a medium of exchange, then maintaining a perfect peg becomes increasingly less important.

"Getting to that future state, however, requires a process of bootstrapping such a network into existence and getting people to collectively believe that such a stablecoin is sound money. This process will be arduous, and will likely be even more difficult for seigniorage shares-based stablecoins that are not actually "backed" by anything." ⁵⁵

⁵⁵ <https://multico.in/capital/2018/01/17/an-overview-of-stablecoins/> - assuming such an event does occur in the medium term future.

The seigniorage model is different from the models of fiat-collateralized and crypto-collateralized stablecoins in that it aims to create stablecoins as price-stable, non-collateralized cryptocurrencies. It was pioneered by Robert Sams in 2014 through the Seigniorage Shares scheme, where seigniorage is in reference to the profit central banks/mints/governments receive from printing money. Seigniorage Shares operate on the premise that the speculative demand for cryptocurrencies creates price volatility which reduces the demand for coins as a medium of exchange, which, in the long-term, reduces consumer adoption, application, and the possibility that the values of cryptocurrencies appreciate. To prevent the speculative demand for money from damaging user adoption of cryptocurrencies, the Seigniorage Shares scheme uses a smart contract with a shares-for-coins and coins-for-shares system to algorithmically regulate coin supply in a bid to stabilize coin prices. Shares represent a claim on the future value of coins and therefore fulfill speculative coin demand, while coins themselves are demanded to act as mediums of exchange. In certain seigniorage shares schemes, shareholders receive voting rights because their shares act as claims on future coin distribution as the demand for the coin increases.

So how does the classic Seigniorage Shares model work? If the demand for coins pushes the price too high, a smart contract issues an auction of coins for shares⁵⁶, which increases the coins in circulation and by extension the money supply. This brings the price of the coin and decreases the number of shares, increasing their value. Issuing the shares would result in excess coins being distributed, allowing the smart contract to earn a profit. If the price of coins determined by the market drops too low, an auction of shares for coins occurs, which decreases the coins in circulation and decreases the money supply. This brings the price of the coins up and increases the number of shares, decreasing their value.

However, if the smart contract does not have enough of a profit to buy these coins, the contract issues shares on the basis that the next time shares will be issued, coin holders will receive a portion of the future seigniorage. This is the only way users will be willing to give up stablecoins for shares and means that a contraction of the money supply is not a final event but based on a future increase in money supply because this will lead to an increase in coins. However, this future increase in money supply is predicated on the assumption that demand for the coin will increase in the future because increased demand is needed to drive the price of the coin up such that an increase in the money supply is required.

This structural feature of Seigniorage Shares creates certain problems though. In the above case of low coin prices, money supply contracts when users remove their stablecoins in exchange for shares that don't offer anything except the expectation of the future growth of the stablecoin. In this sense, the currency is self-contained and it is not backed by collateral, a reserve peg or anything external, increasing its risk factor because users are giving up stablecoins of certain, present value for uncertain value in the future.⁵⁷ This risk is heightened in the case that the currency is not adopted since lower demand for the currency means the price will not rise enough to generate adequate stablecoins to reward users for giving up stablecoins when money supply needs to contract. It also makes the currency vulnerable to a secular decline in the cryptocurrency market, since, according to Myles Snider, seigniorage shares can only exist if there is "perpetual growth of the stablecoin system." Furthermore, if coin adoption starts to stagnate and the price falls, the uncertainty over how much downward pressure the currency can handle would make traders even more uncertain, leading to more sell-offs, and ultimately, a death spiral. Thus, it is likely that such coins can liquidate to zero. However, there are different protocols that are working to solve these challenges with variations to the general model. For example, Basis was going to allow for the expiry of bonds.⁵⁸ In addition, the level of complexity in understanding the stability parameters of Seigniorage Shares and the amount of money supply it can reduce contradicts the ease of comprehension and transparency needed in the ideal stablecoin. This, coupled with the coin's vulnerability to crashing, increases the risk profile of Seigniorage Shares, and non-collateralized cryptocurrencies generally, as a model for stablecoins. However, in an imperfect world it is the trade-offs that matter and thus non-collateralized schemes like Seigniorage Shares offer the most decentralization and independence since they are not tied to fiat or collateral. Since they don't require collateral to operate, they also require the least start-up capital.

⁵⁶ Using a smart contract for the auction is a design decision. These auctions could be handled on-chain or off.

⁵⁷ As James Evans of Basis notes: "it is worth keeping in mind that someone buying a seigniorage share is taking on some risk for the prospect of a return on their investment, like someone trading USD for an off-chain investment."

⁵⁸ <https://www.basis.io/article/could-a-crisis-of-confidence-cause>

Basis (Basecoin)

Basis pegs their price to \$1 USD, but preserves the ability to shift to a peg that is independent of any fiat currency (such as a consumer price index) in the future. Their approach uses smart contracts to contract and expand the supply of their coin. When coins are trading for less than \$1, coins are contracted by allowing coin holders to buy bonds, a separate class of token. Coins used to buy bonds are destroyed, decreasing supply and increasing price. To expand supply, coins are minted and distributed to bond tokens and share tokens (a third class of token).⁵⁹

*Note: As of December 13, 2018, Basis has decided to shut down.*⁶⁰

Aurora (Boreal)

Decentralized Capital is the free decentralized bank, and Boreals are the stablecoin token of the Aurora project. They manually manage the token supply to maintain price stability, originally defined as parity with USD. They plan to transition over time to a basket of goods and commodities.

They will operate the same way a bank would: Decentralized Capital will lend Boreals into existence with some fraction of backing reserves held by the bank to cover withdrawal demand. In order to prevent instant liquidation, they provide intrinsic use value to Boreals with discounted fee payment on their decentralized exchange, IDEX; they accept loan repayments only in Boreals; and they aim to partner with businesses and other dapps to accept the token directly. It remains to be seen whether this network bootstrapping plan will generate enough demand to reduce the selling pressure on the token from the recipients of the loans.

Fragments (USD Fragment)

Fragments operates similarly to Basis, except when increasing token supply, the protocol will issue to existing token holders rather than the bondholders. So, a holder who bought one token and never sold would find more tokens in the wallet over time. Emissions also go into two further reserves: one that funds future development and another that buys ether as reserves to have ready when supply needs to contract because prices are falling.

Kowala (kUSD)

Kowala follows the seigniorage model fairly closely. The oracle problem is solved by utilizing the Kowala corporation to provide a trusted feed of exchange prices. Miners adjust the mining reward according to this data feed, which is the primary method of increasing the token supply. If the minimum mining reward has been reached but the price differential requires more contraction of the token supply, a “stability fee” may be applied. This is a transaction fee which is sent to a dead-end address, reducing the total amount of usable currency.

BitBay

Using a seigniorage shares model, BitBay maintains a stable value for their coins by using a dynamic peg. The dynamic peg is based on a voting system which creates two balances for BAY tokens: frozen or liquid. The frozen balances are such that they move much slower i.e per month. Thus, in the case the price falls relative to USD, users can vote to freeze part of the token supply, which raises the value of tokens in supply. Similarly, if the price spikes, users can vote to liquidate some of the token supply, increasing supply and bringing price levels down. In the case users are not available to participate in voting, an automatic algorithm votes for the user, guided by the need to maintain healthy volumes and for the value of the token to appreciate over time.

⁵⁹ <http://basis.io/>

⁶⁰ <https://www.theblockcrypto.com/2018/12/12/stablecoin-project-basis-is-shutting-down-and-returning-the-majority-of-capital-raised-to-investors/>

Corion

Another seigniorage shares model, Corion uses inflation/deflation controls to keep the price of the token/coin stable. In case there is inflation, Corio will increase token supply at a maximum rate of 2.5% per day. In case deflation is necessary i.e. the token falls below 1 USD, Corion will halt coin release for the day and 80% of fees charged for transactions will be burnt and removed from the system. Furthermore, if supply needs to be drastically cut, Corion will conduct coin parking to remove coins from exchanges. In exchange for having a valid balance and keeping coins out of the market, users will receive daily rewards. Corion also uses a Schelling point to solve the oracle problem and asks users to submit predictions for the price of coin relative to USD.

Topl (Poly)

Topl is building the technology necessary to more effectively link \$9 trillion in investment demand to target opportunities throughout high potential emerging markets while blending socially motivated capital with traditional investment to provide better returns and increased impact. Leveraging its own native blockchain core, the Topl protocol leverages features such as crowd-sourced due-diligence, DSL smart contracts, tokenized social outcomes, and sidechain interoperability, to make emerging markets more accessible, transparent, and attractive to investors. The entirety of Topl's vision is centered around remaking markets to better support economic development and inclusion. Poly is not backed by any collateral asset, either on-chain or off-chain. The Poly system distributes new currency proportionally across its entire economy--leveraging transaction fees to reduce supply when necessary. Poly is not designed to mirror an external fiat currency or basket, rather measuring stability to itself as a function of time.

Orcs

Orch Stablecoin aka ORCS is a non-sovereign non-collateralized stable cryptocurrency.

It runs on top of a real-time unforkable blockchain platform Orch.Network. The price of ORCS is stable relative to multiple indices: a basket of hard currencies: USD/Euro/CHF, OECD CPI data, internal hashrate and transaction fee of the underlying decentralized network.

Mile Unity (MILE)

MILE coin is part of an ecosystem with the stablecoin XDR, which is backed by the IMF's Special Drawing Rights (SDR) It is based on the MILE blockchain, which was created by a team of anonymous developers known as Lotus Mile. MILE offers transparent emission, fast transactions (10,000/second) with low commissions (0.02 MILE). It is decentralized on 10,000 nodes all over the world, which are each owned by different people and organizations. MILE is a useful tool for cross-border transactions, investments attraction and money remittance.

Hybrid/Other

Algorand

Algorand is a stablecoin which uses an algorithm or Stabilization Protocol to control the coin supply in circulation to stabilize the value of the coin. The coin also uses bonds to stabilize the price through the creation of a decentralized Treasury, 6 to 12 months after the currency is launched through an auction. If the price of Algos is increasing too quickly, the Treasury will sell Algos via Dutch auctions, thereby increasing supply, and if the price of Algos are decreasing, they will buy back Algos based on the most recent highest price, thus contracting supply. Algorand has a democratic governance model, wherein there is a propose-and-agree governance structure where Algo coin holders propose rules for the monetary policy and development of the coin. Their proposals are voted on by all Algo holders, who votes are weighted according to the amount of

currency they hold. Algo holders also appoint a Technical Advisory Group of 5 members who will oversee development of the currency and will be in charge of appointing members with reviewer privileges who are responsible for evaluating proposals and modifications to the blockchain protocol. Mining the coin is replaced by Protocol Participation, wherein users of the blockchain are rewarded for participating in governance decisions for Algorand and are rewarded for the amount of currency they hold and the time that they participate in the protocol.

Reserve

Reserve is a stable global currency and a digital payment system for people in developing nations with extreme inflation. Reserve will operate a Protocol that maintains a stablecoin backed by collateral tokens that still contains aspects of algorithmic seigniorage. Smart contracts perform price stabilization by trading collateral tokens against the stablecoin when needed to contract or expand supply. When these collateral tokens undergo periods of decreases in value, the Protocol mints and sells Reserve Share tokens in order to raise capital to restore the backing to 100% of the stablecoin supply. In this way purchasers of the Reserve Share token offer short-term capital to the system during times of need. In return, they are rewarded with dividends from the future profits of the Protocol, which are derived from appreciation of the collateral tokens and transaction fees.

Carbon (CUSD- Carbon USD)

CarbonUSD is the first and only hybrid fiat-algorithmic stablecoin. Starting off with one-to-one backing with USD is essential for bootstrapping the market's trust in a trust-minimized, algorithmic stablecoin without depending on high exchange liquidity early on or the management of an initial reserve (i.e. where investors might want upward price pressure but users want price-stability). While CarbonUSD launched on Ethereum, the team is developing interoperability solutions with multiple blockchains that have high transaction throughput and growing ecosystems. In November 2018, for example, Carbon launched the first stablecoin on EOS.

Xank

Xank is a free-floating cryptocurrency that offers stablecoin functionality through its optional Stable Pay feature. This mechanism fixes the exchange rate between Xank and other currencies on demand, providing for a non-volatile stable currency. Xank does not maintain a constant fiat pegged position, enabling it to be capital efficient.

StableUnit

Stableunit is a decentralized stablecoin which will evolve from being overcollateralized when the system is small to an algorithmic stabilization process when the system grows bigger. In this sense, it is a hybrid stablecoin which also uses seigniorage shares to prevent price volatility. The coin is protocol agnostic and built as a fork on existing protocol. It uses a multi-layered stabilization system, starting first with trading movement, going to a stabilization fund which uses smart contracts to control the coin supply from a reserve pool of Stableunit tokens, to the use of bonds, to share dilution and finally to parking funds in the case of a black swan event where the price of the coin needs to recover drastically.

Alchemint (SD-eur, SD-usd)

The Alchemint stable token is known as SDS. It involves a decentralized way of issuing fungible stable tokens. Institutions lock SDS into a SAR (Smart Asset Reserve), which determines the maximum amount of stablecoins that can be issued based on a margin ratio. The institution accepts external assets such as fiat currency, and issues stablecoins based off of that. If there is asset seizure or other issues, the holders of stablecoins issued under that SAR can vote together to split up the SDS locked up in the SAR. It has some aspects of crypto-

collateralized solutions since it involves locking up a cryptocurrency as a bond guaranteeing the SAR, but by and large, it is a method of decentralizing the ability to do traditional collateralization into a shared token.

Celo

Created by former GoDaddy execs, Celo is an Android-based cryptocurrency application which allows users to send and receive money on their mobile phone through the blockchain. The application consists of a decentralized database which maps users' phone numbers to public encryption keys (a novel address-based user encryption algorithm), and a hybrid stablecoin which functions as a medium of exchange. The stablecoin follows a hybrid model, where it is backed by an overcollateralized basket of cryptocurrencies and also uses an algorithmic seigniorage shares model similar to Basis which expands and contracts coin supply to stabilize the price of the coin.

Rya

Rya is a cryptocurrency and monetary system designed to be both a store of value and a medium of exchange. Using a free, decentralized monetary market, the Rya system tethers money supply to credit without the need for a monopolistic regulatory institution. Money supply is adjusted dynamically depending on economic cycles making for a better medium of exchange. Rya and its Proof of Trust (PoT) model is therefore expected to be a fuller and more complete substitute for Fiat monetary systems than any cryptocurrency yet.

PHI

Phi's approach is unique. Rather than back the currency by an external collateral, it is backed by its own issued loans. The PHI tokens come into being when they are loaned out. Loans are made if it can pass the scrutiny of a network of bonded human validators. Defaulted loans are subtracted from the validator bond, and legally convert into direct debt to that individual, to which personal debt law is applicable. The computer acts as market maker on the exchange. Demand for the token is assured through the need for loan repayment, and supply of the token is met through issuance of new loans and the release of tokens issued to match expected interest. This latter mechanism ensures there will never be a net lack of currency to pay back all outstanding loans.

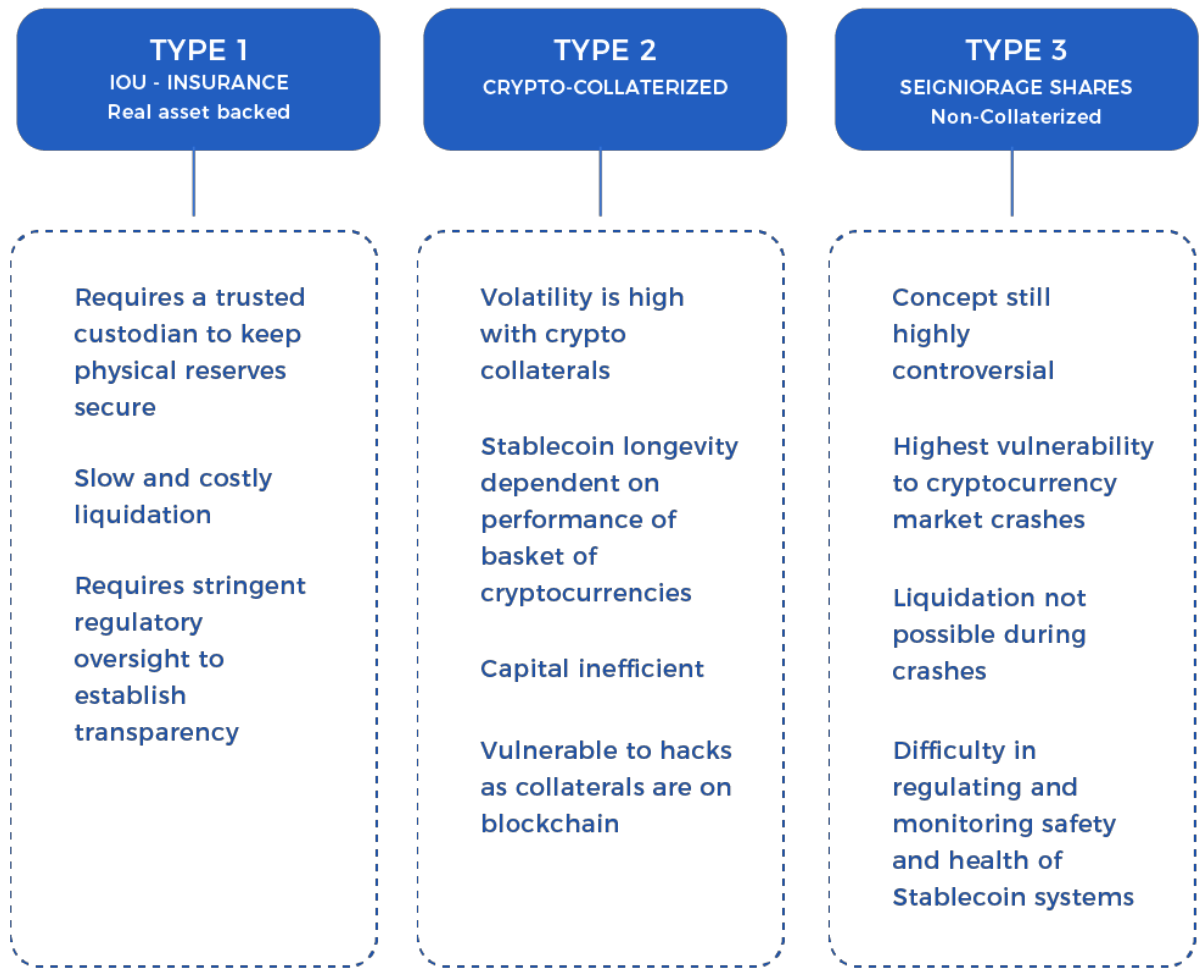
Standard.one (aka CementDAO)

Standard.One allows holders of different stablecoins to deposit them into diversified stablecoin baskets, receiving a lower-risk meta-stablecoin in exchange. These baskets will provide an efficient mechanism for pricing and risk management and enable transparent, real-time valuations of the underlying stablecoins. Standard.One is a decentralized organization that aims to promote the stablecoin ecosystem by assessing and reducing risks, with the ONE token used for governance.

mStable

mStable is pioneering a novel meta-stablecoin stabilisation mechanism. By combining multiple types of stablecoins as collateral, mStable is able to minimize the impact of the three trade-offs currently plaguing stablecoin design. The system would be decentralized, verifiably collateralized, scalable, and minted/redeemed on-chain. It achieves this while minimizing system-wide risk by diversifying across stabilization mechanisms and across multiple asset classes. mStable will adapt to and integrate future stablecoin innovations as its baskets are able to evolve over time.

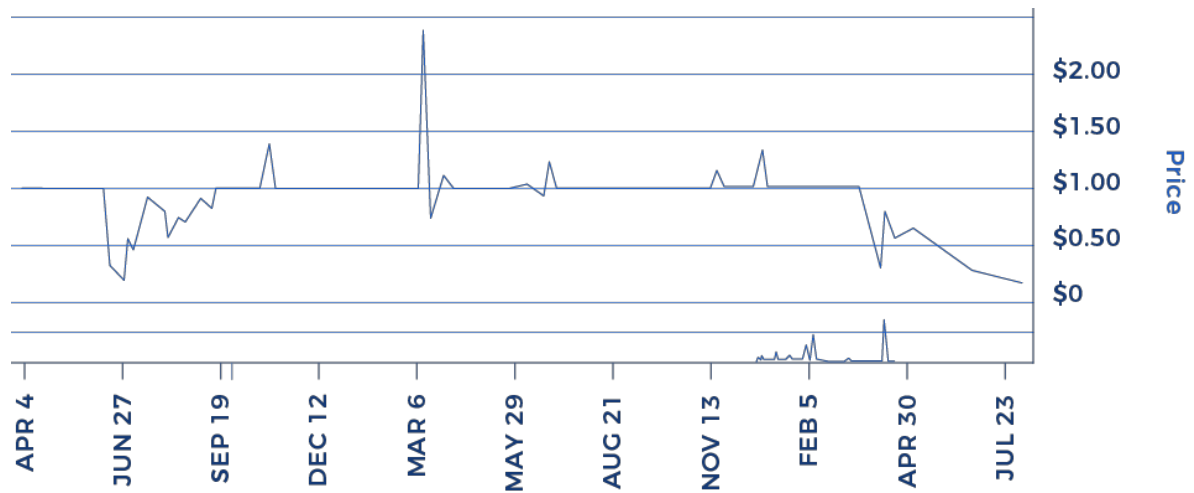
WEAKNESSES OF STABLECOINS



Stablecoin Failure

A cautionary tale and quintessential example of the failure of a stablecoin is the story of Nubits. Nubits was neither collateralized nor supported by a verifiably executable seigniorage model. Their model of maintaining price stability was supported by a manual dual-token system, decentralized across a number of agents tasked with propping up the system by buying or selling NuShares for NuBits. During a large sell-off, a number of the network participants refused to fulfill their obligation to the network, breaking the peg and damaging the reputation of Nubits as a stablecoin. It stabilized back to its peg and the market gave Nubits one more chance. In March 2018, when they ran out of investor funds to use to maintain the buy wall, the peg was broken for the second time. It was delisted from a number of major exchanges and confidence and funding are most likely permanently compromised.⁶¹

⁶¹ <https://cryptovest.com/news/nubits-usnbt-loses-peg-to-dollar-no-recovery-in-sight/>



There are several lessons to learn from the failure of Nubits. A manual seigniorage stabilization method can work, as it does for governments if the actors are a professional group of people individually accountable under the laws of their government or some other system of compulsion for their actions or failure to act. Decentralizing control is virtuous in the sense of eliminating too much influence over a currency by a single corruptible intermediary. However, unless there is individual accountability and consequences to incorrect action, there is no guarantee of the agents actually taking the proper course of action. Verifiable execution (smart contracts), on the other hand, is a way of provably causing specific actions to happen in the face of certain causes. The centralized, human-fallible problem is reduced to the oracle problem (receiving correct information from outside the blockchain) and the absence of exploitable bugs in the smart contract code.

There is also an important argument to be made about the advisability of having the stabilization of the token be dependent on sales of its own shares.⁶² It is the kind of circular dependency that only works when it works; in a failure scenario, shareholders are likely to lower the value and effectiveness of the shares at the moment when high value of the share class token is most needed. This combined with a high level of issuance of new shares was part of what doomed the final attempts to maintain Nubits' peg.

Recently Bitshares BitUSD went into a global settlement.⁶³ This means that users can no longer borrow, but they can convert it into collateral (BTS) at the global settlement price, currently about \$0.70. This happened because the dollar value of the collateral backing bitUSD dipped below the outstanding supply of bitUSD, leaving all bitUSD under-collateralized and triggering a massive margin call as the margin positions dipped dramatically below the collateral ratio. This is a black swan event.

FEDCOINS

One alternative to stablecoins that also needs to be considered is the concept of 'Fedcoins' or Central Bank issued digital currency. The concept is straightforward: Governments or central banks will issue their own dollar backed digital tokens. There are a few main benefits that would influence a government or Central Bank to do this:

1) Improved Resilience

The Fed currently maintains one of the largest and most important ledgers in the world. The Fed uses a system called Fedwire to maintain all of its transactions. Surprisingly enough, Fedwire is only maintained by 3 centralized locations: One in New Jersey, one in Richmond, and one in Dallas. If for some reason all three of these locations were to go down, the whole system would fall apart. By developing some sort of Central Bank issued electronic money or Fedcoin, governments, including the United States, would be able to take advantage of a distributed network where the network would be run by thousands of different nodes.

⁶² <https://jpkoning.blogspot.com/2016/08/end-of-stablecoin.html>

⁶³ <https://steemit.com/bitshares/@haruka/detailed-mechanism-of-global-settlement-black-swan-and-reviving-of-bitassets>

2) Lower Costs

More likely than not, running a distributed ledger would be much cheaper than maintaining billions of paper notes in circulation. Paper currency involves all sorts of expenses including designing and printing notes, collecting, processing and storing them, as well as constantly defending the note issue against counterfeiters. Having a distributed ledger would be likely to reduce these costs. If Fedcoins were to slowly displace cash, the Fed's costs would fall and its profits rise to the benefit of the taxpayer.

A Fed coin would be structured using the concept of seigniorage shares that a few other cryptocurrencies are testing out. The Fed would have the special powers to create and destroy Fedcoins, as well as providing two-way physical convertibility between paper dollars and Fedcoin at a rate of 1:1. Fedcoin could only be created at the same time that an equivalent reserve or paper note was destroyed and, vice versa, Fedcoin could only be destroyed upon the creation of a new paper note or reserve entry in order to maintain price stability. If there was ever a discrepancy in price, users would simply take advantage of that arbitrage by exchanging Fedcoins for dollars or vice versa.⁶⁴

What makes the concept of a Fedcoin so much different than a traditional stablecoin? There are a few main reasons:

1. Transparency of the underlying asset - Unlike other dollar backed stablecoins like Tether, a Fedcoin has the potential to be more transparent with the actual amount of dollars or reserves it is backed by.
2. Dollar/Reserve Convertibility - While other cryptocurrencies try to claim they are backed by the dollar, often the path of conversion back into dollars is murky or dubious, similar to the way things worked with gold during the gold standard era. A Fedcoin would have the Fed's guarantee behind conversion of the cryptocurrency in dollars/reserves, which could make the concept more viable for consumers.
3. Ease of creating/destroying Fedcoins - One issue seigniorage based stablecoins are having to manage the creation and destruction of the stablecoin. Usually there are two pieces involved, call them a 'coin' and a 'ticket', which are both used to offset the other via the seigniorage system. The system is prone to fall apart because of the limited trading nature of both pieces. A Fedcoin, on the other hand, is offset by the dollar or a reserve, which has traded for hundreds of years.

Multiple countries have already begun to explore the idea of using Fedcoins or Central Bank issued electronic money and many more plan on following. Here are a few notable examples:

Singapore: Project Ubin is an initiative sponsored by the Monetary Authority of Singapore (MAS) to explore the applicability of distributed ledger technology for Singapore's financial ecosystem. The idea was to develop a payment system for participants to transact in different global markets round-the-clock that are today limited by time zone differences and office hours. Phase I of the project successfully achieved the objectives of producing a digital representation of the Singapore dollar for interbank settlement.

The Caribbean: A start-up called Bitt has signed an agreement with a few Caribbean islands to launch a digital payments platform. Bitt has been working to position island nations in that region as global leaders in the adoption of digital national currencies, allowing everyone with a smartphone, tablet, or computer to easily make digital domestic transactions.

Cambodia: The National Bank of Cambodia is working together with a start-up called Soramitsu on developing new payment infrastructure using DLT systems.⁶⁵

Thailand: The Bank of Thailand (BoT) has announced it expects to complete the first phase of a proof-of-concept trial for a central bank digital currency (CBDC) by March 2019.

⁶⁴ <https://jpkoning.blogspot.com/2014/10/fedcoin.html>

⁶⁵ <https://www.coindesk.com/cambodias-central-bank-signs-deal-develop-blockchain-tech/>

Sweden: Sweden's central bank, Riksbank, is reportedly looking into introducing a digital currency to the country, called the eKrona. The idea makes a lot of sense for Sweden as it is on track to become one of the first countries in the world to go completely cashless.

South Africa: South Africa created Project Khokha, which was designed to simulate a real-world trial of a distributed ledger technology based payment system. The results of the project demonstrated that it was able to handle the typical daily volume of the South African payments system. Payments were processed in less than two hours with full confidentiality of transactions and settlement finality, with each transaction processed within two seconds, across a network of geographically distributed nodes.

Venezuela: Venezuela, currently dealing with severe hyperinflation, created a new digital currency, the Petro. At the announcement of the currency, Maduro said the Petro would allow Venezuela to: "advance in issues of monetary sovereignty, to make financial transactions and overcome the financial blockade." The new currency would be backed by Venezuela's oil, gas, gold and diamond wealth.

Barcelona: Barcelona has launched a blockchain currency to promote and incentivize local trade starting with €1.5 million of Recurso Económico Ciudadano (Citizens' Economic Resource) or just Rec. One Rec is one euro with its exchange guaranteed.⁶⁶

BRICS: Russia is looking at ways to create a supranational cryptocurrency for BRICS (Brazil, Russia, India, China, and South Africa) or the Eurasian Economic Union (EEU), mainly to help them avoid sanctions placed on them by the US.

Brazilian National Social Development Bank: This bank will launch a pilot in January 2019 for the BNDES token, which runs on the ethereum blockchain and is backed 1-for-1 by Brazilian real.⁶⁷ This stablecoin is expected to maintain parity with Real.

Japan (Mizuho Bank): Mizuho Bank is launching a Japanese Yen backed stablecoin by March 2019 called "J-coin". This initiative already has 10 regional domestic banks on board where consumers can use the stablecoin at any of the participating banks. The plan is to use it for shopping and ecommerce without any transactional fees for users.⁶⁸

Iran: Iran is launching a gold-backed stablecoin called paymon (which means covenant in Persian). The coin was designed and developed by an Iranian company called Kuknos. Transactions will be tested with 4 Iranian banks. The coin will also be traded on the local OTC market; Fara Bourse.⁶⁹

The Utility Settlement Coin

UBS and Clearmatics spearheaded the Utility Settlement Coin which is being used by a consortium of the world's largest banks. The USC will be an internal token that is fully collateralized by the electronic cash balances of these banks with a version for the different major currencies which are convertible at parity with a bank deposit in the corresponding currency.⁷⁰ This effectively guarantees a 1:1 peg. These are held and backed by cash at the Central Bank itself which prevents netting, default, payments and credit risk.

⁶⁶ <https://www.trustnodes.com/2018/10/04/barcelona-launches-blockchain-currency>"

⁶⁷ <https://www.coindesk.com/this-brazilian-bank-is-using-ethereum-to-issue-a-stablecoin>

⁶⁸ <https://asia.nikkei.com/Business/Business-Trends/Mizuho-to-launch-digital-currency-to-promote-cashless-payments-in-March>

⁶⁹ <https://www.aljazeera.com/news/2019/01/iran-central-bank-issues-draft-rules-cryptocurrency-190129051653656.html>

⁷⁰ <https://ftalphaville.ft.com/2017/09/18/2193542/what-is-utility-settlement-coin-really/>

Section 4

Problems With Fiat-Collateralized Stablecoins

Storing funds in the traditional financial system is backing the token within a centralized system. This has all the drawbacks of centralization. There is a single point of failure: if the accounts are compromised in any way, by government intervention or corrupt intermediary, the backing of the token is eliminated.⁷¹

Transparency is difficult. Professional audits are expensive, affecting the necessity for value extraction in the operation of the stablecoin (transaction fees, etc.), and even with that it still involves trusting the word of another trusted intermediary. Finally, there is often no legal guarantee in place to maintain funds or redeem tokens.

Problems With Crypto-Collateralized Stablecoins

The collateral itself is volatile, requiring a large over-collateralization to maintain reserves in the face of decreasing the collateral value. In the face of a black swan event, where all the cryptocurrencies' values were to drop together, this type of stablecoin would be unable to keep its peg.

Problems With Seigniorage Stablecoins

Getting correct price data to make trading decisions on is paramount; however, Oracle systems are on the whole centralized. There are several decentralizing technologies being tested but it is hard to say at this point which will function and which have unforeseen security vulnerabilities. The stabilization code of most tokens of this type is complex and unproven. It is immensely difficult to model the behavior of large economies accurately and especially to predict the anatomy of an outlier event. It is safe to say that not all of the algorithmic stablecoins will be successful; this may or may not be because of flaws in its algorithm and it may not be possible to analyze post factum what the cause of its collapse was. Lastly, many of these projects fall back to centralized methods of stabilization. This is practical in the case of unforeseen events or responses but it does undermine the decentralization of the system somewhat. Another problem is even if a particular stablecoins algorithms prove successful in maintaining prices around a peg, if a black swan event occurs in a fellow stablecoin in the sector it could potentially lead to a cascading series of collapses as algorithmic/seigniorage type stablecoins are stress-tested by the market.⁷² Admittedly this would be a problem for all the entire stablecoin ecosystem.

Two big problems with off-chain collateralized stablecoins:

1. Counterparty risk - What if the issuer chooses not to maintain the buy-wall at some point? The headline "crypto company absconds with \$3 billion in assets" doesn't sound too far-fetched. We think the best traditional asset-backed stablecoins will be issued by trusted banks and perhaps trusted governments, which tend to have more reliable governance. But even banks and governments are not trusted everywhere in the world.
2. Risk of government intervention - What if the local government decides to freeze the assets or a powerful foreign government decides to put pressure on the issuer? Governments have well-developed capacities to prevent money laundering, which have been used to shut down multiple virtual currencies in the past. In practice, this may not reach the stage of asset seizure and may just lead to the issuer losing banking relationships again and again since banks want to stay in the good graces of their local governments.

⁷¹ <https://medium.com/@lebed.2045/gemini-can-make-gusd-non-transferrable-at-any-moment-code-review-a28d58ef6a61>

⁷² <https://www.smithandcrown.com/cryptoeconomics-seigniorage-shares-look-basis-carbon/>

These two core problems create a fundamental tension:

The better the audit mechanism, the more credible the promise to use reserves to maintain the buy-wall and thus defend the exchange-rate peg, the easier the job of the government to locate and freeze the assets. The worse the audit mechanism (all the way to just not providing any audits and keeping banking relationships secret, or not even telling the banks they are holding assets used by a crypto company), the harder the job of the government to locate and freeze the assets, but the harder it is for the market to assess the issuer's solvency and ability to maintain the buy-wall.

Tether is a prime example of this phenomenon. They reneged on a public audit of their funds, leading to a twitterstorm and public crisis of confidence. There was much speculation that they were running a fractional-reserve instead of being fully collateralized. However, Bitfinex has recorded large profits more than enough to redeem outstanding Tethers. So why refuse an audit? They have had to change banks several times when the bank learns they are helping to operate a cryptocurrency. It is possible that Bitfinex was not willing to put their banking relationship at risk by submitting to a public audit. It is notable that even with a public outcry this did not affect the price of USDT.

The problem with on-chain collateralized: First, and easier to understand, is that if the price of all of the locked up collateral starts to go down too fast or something else unexpected and damaging happens, a group of people with special rights can choose to wind down the system. If they do this all of the stablecoin holders can trade their coins for \$1 worth of the collateral crypto assets. Since this promise exists, in theory speculators will want to buy the stablecoin if it is ever below \$1 in order to be able to either (a) sell it for \$1 when the secondary market price goes back up, or (b) redeem it for \$1 of collateral assets in this wind-down scenario. In theory, these speculators will provide a buy-wall at some discounted price slightly below \$1, and will maintain the peg so long as they have the capital to do so.

Seigniorage-style Algorithmic: This design was originally proposed in an informal paper by Robert Sams a few years ago. In the original design, there are two tokens, stablecoins and shares. When the price of the stablecoin is above the target price, the system mints more stablecoins and offers them in an auction. The currency used to buy stablecoins in the auction is the share token - so only share token holders can participate, and the highest bidders are the recipients of the newly minted stablecoins. The increase in stablecoin supply presumably reduces the market price back down to the target. When the price of the stablecoin is below the target price, the reverse happens - the system mints new shares, and auctions them off for stablecoins. By doing this, the system can reduce the supply of stablecoins and bring the price back up.

Why would people buy shares? The idea is that you can trade N stablecoins for shares now, and then trade those shares back for $>N$ stablecoins later when the system needs to increase supply to keep up with a new big wave of demand.

This is an interesting design in that there is no collateral from outside of the system - it's all self-contained. So then we must ask: If it's implementing an exchange-rate peg, where is the reserve? How do we use our framework to analyze the reliability of the exchange-rate peg?

We can translate it into the terms of our framework in order to do that. The reason we have to look at the size of the reserve is to see how much the supply of the pegged currency can be reduced in order to respond to a decrease in demand. In this system, the level of supply reduction that can be achieved is simply the number of dollars worth of shares that can be minted and sold for stablecoins at any given point in time. Let's call this the "implied reserve."

The implied reserve is made up of assets that are held by speculators. You can visualize the big crowd of people and trading bots out there, ready to buy shares in an auction under the right conditions; however much money they would be willing to part with at any given moment is equivalent to the amount of money that a nation implementing a peg is willing to part with from its reserves. This is what makes up the buy-wall - any time the price of the stablecoin is less than \$1, the system starts offering shares, and in order to buy shares you need stablecoins, so the speculators all buy coins on the secondary market at a price just below \$1.

The central problem with this design is that if at any point those speculators lose interest in purchasing shares the peg breaks since no stablecoins can be taken out of circulation. This is analogous to a nation holding reserves and deciding not to spend them to defend the peg for some reason. If growth in the market cap of the stablecoin is perceived to be highly probable by the market, this would be unlikely to happen, since it would be clear to the market that there is always money to be made by purchasing shares at some price. But in the early stages of adoption, growth in the market cap of the stablecoin may sometimes not be perceived as highly probable.

The on-chain reserve currency is a mixture of Reserve shares, akin to Seigniorage Shares, and external crypto-assets, thereby bringing in on-chain crypto collateral. While this approach is decentralized and transparent, since users can verify the collateral backing on the blockchain, it has a few drawbacks. Tokens using highly volatile cryptocurrencies as reserves must be over-collateralized to account for a possible drop in the value of its reserves. The contraction of the money supply requires a large supply of reserve currency at all times which is not capital efficient and requires high start-up cost, along with inviting the risk of hacking. It also relies on external oracles to feed in the prices of the crypto assets in the reserve which creates an element of unreliability.

Final Thoughts

Cryptocurrencies began with no intrinsic value, just with the ability to act as a medium of exchange. The rise of their perceived value resulted in them being treated as a speculative investment. To be useful as a store of value, many are seeing the need for a price-stabilized cryptocurrency. Fiat's predecessor was an asset-backed stabilized money, at the time gold and silver. Slowly the majority of the world's money became currencies actively managed and backed by faith in its associated government and the ability to pay taxes. The cryptocurrency world, seeing the need for some type of stabilization, is entering into a broad range of experiments right now that run the gamut of the entire history of money: from collateralized asset-backed, gold-backed, fiat currency collateralized monies, to more recent styles of managing price by managing circulating supply, to something new made possible by the transparency and verifiability of cryptocurrency, which is monetary policy encoded by smart contract.

The only technologies that we know for sure that work is collateralized solutions -- although even those are only as stable as their underlying assets. The crypto-collateralized solutions are taking that one step further into smart contracts. Algorithmic Seigniorage tokens are extremely promising but have yet to prove themselves. Seigniorage and algorithmic seigniorage based tokens both rely on some element of economic system level trust; faith in its value is a self-fulfilling prophecy, an image which is backed by the company and all the resources and reserves it can muster to maintain it. This is a historical moment to watch which of these experiments fail, and why, and which of them rise up to become a global medium of exchange, a universal bearer token, perhaps even a money for the new world.

Conclusions

1. Many of the brightest minds in crypto and traditional markets are working on stablecoin projects as well as investing in the projects. They are taking different strategies in deciding the best way to make money stable. (eg. Myron Scholes is advising Saga and Stanley Druckenmiller had invested in Basis, prior to Basis folding)
2. Our current monetary system has resulted in a global level of price instability and inflation and cryptocurrencies may offer reprise from what for a long time has been a less than ideal status. Stablecoins offer an important evolutionary step in the growing fields of blockchain and cryptocurrency to tackle this challenge.
3. Stablecoins pegged to dollars may increase the total money supply of fiat. This could lead to inflation and instability if stablecoins become a trillion dollar industry.
4. The rise of cryptocurrency as a new asset class has brought about a new economy and paradigm for financial systems. In this rich and diverse ecosystem the development of stablecoins, price-stable cryptocurrencies, asset-backed cryptocurrencies etc is likely to play a critical role in how this new economy achieves mainstream adoption.
5. The majority of stablecoins being developed are fiat-collateralized to the US Dollar, however, this creates systemic problems when designing a stablecoin. Fundamentally, a currency peg is difficult to maintain within a band with market upswings and downswings because it has to withstand market volatility and it is costly to maintain a peg within the band. It is also difficult for traders and arbitrageurs to analyze what parameters are structuring the stability of the currency peg and observe how different market behavior affects the price of the currency peg. In the latter case, the currency peg should have easily observable Schelling points/equilibria; i.e. in the absence of communication, participants will reach a consensus on price based on the most salient feature. To solve these problems, the ideal stablecoin should be able to withstand market volatility, be affordable to maintain within a value range, have easily comprehensible stability parameters and be easy to observe for traders and other market participants.
6. The US Dollar will be the most tokenized liquid asset in the cryptocurrency space in next 12-24 months.
7. Adoption for blockchain based value transfer will be driven by an open protocol suite.

8. The cryptocurrency bear market (now almost 1 year old) has led to the growth of stablecoins as many market participants have wanted downside protection from extremely volatile conditions. When that money is redeployed back into the cryptocurrency markets it should act like quantitative easing as massive buying begins.
9. While fiat-backed stablecoins seem to address some of the key problems in crypto (e.g. onramps and offramps and AML) and is being welcomed by some, it is very different from the censorship resistant, non-sovereign digital money without the need for third parties narrative crypto began with.
10. Developed countries will not be the first adapters of stablecoins since they have “stable” fiat currencies, adoption will probably happen in the developing world first.
11. More big tech corporations and financial institutions will follow Facebook and JO Morgan to enter the stablecoin marketplace to develop new products. This will be done in an effort to retain users.
12. The holy grail of stablecoins is to become the decentralized central bank for the internet. However, in order for this to be achieved and for a global reserve currency to emerge the internet needs to be truly decentralized.
13. Web 3.0 can allow this to happen as it facilitates the creation of native economic value by any participant and the transfer of this native value to any participant. This is possible because blockchains allow for participants in a network to hold and transfer state in a digitally native format.⁷³
14. In the next phase of cryptocurrency, it will be programmable. There will be much more information available than the transferring of tokens from one wallet to another. It will include metadata about the contents of a transaction and will include a shared accounting layer.
15. A successful algorithmic stablecoin would ideally allow for the upside of speculation on the share or upside class with a stability mechanism of a stable class that could use blockchain for instantaneous transactions. In an ideal world this could create adoption via speculation and stability simultaneously.
16. Collateralized stablecoins must have a value backed by something you want to use as a medium of exchange and be easy to liquidate. Until now this has been mostly done by depending on government-sponsored currencies and financial tools. If you are collateralized and want to be decentralized you have to keep decentralized assets as collateral. If you have physical assets as collateral this opens up for centralized points of failure. This will be the next iteration for stablecoins as they grow in acceptance.
17. In place of a decentralized stablecoin a government may simply attempt to issue a central currency which remains relatively stable.
18. Stability is currently assumed to be tethered to the USD, but in the future, the technology may evolve so that stability is tied to a basket of tokenized assets rather than the USD.
19. Secondary solutions can be built on the back of a stable currency like insurance escrow and trade settlement.
20. Enterprises and banks are working on their own versions of stable currencies for inter-bank transfers, trade finance and the digitizing of fiat backed currencies.
21. End users need stability. Volatility is what is keeping cryptocurrency as a niche digital asset favored by speculators instead of a revolutionary technology that allows a decentralized, trustless and secure flow of stable money.
22. Many token projects may re-evaluate the need for their native token and issue a stablecoin instead while allowing other avenues for investors to capture upside in the project.
23. Money being issued and created solely by governments will start to become tested as competitive currencies and money systems emerge which are designed to make money programmatically stable and usher in a new era of decentralized finance.
24. Monetary maximalism-the idea that only one currency will emerge as the winner- is highly unlikely to occur.

⁷³ <https://blog.coinbase.com/understanding-web-3-a-user-controlled-internet-a39c21cf83f3>

Cryptocurrencies began with no intrinsic value, just with the ability to act as a medium of exchange. The rise of perceived value fueled them being treated as a speculative investment. To be usable as a store of value, many are seeing the need for a price-stabilized cryptocurrency. Fiat began as an asset-backed stabilized money, at the time gold and silver. Slowly the majority of the world's money became currencies actively managed and backed by faith in its associated government. The cryptocurrency world, seeing the need for some type of stabilization, is entering into a broad range of experiments right now that run the gamut from the entire history of money: from collateralized asset-backed, gold-backed, fiat currency collateralized monies, to more recent styles of managing price by managing circulating supply, to something new made possible by the transparency and verifiability of cryptocurrency, which is monetary policy encoded by smart contract.

The only technologies that we are fairly sure will work is collateralized solutions -- although even those are only as stable as their underlying currency. The crypto-collateralized solutions are taking that one step further into smart contracts. Algorithmic Seigniorage tokens are extremely promising but have yet to prove themselves. Seigniorage and algorithmic seigniorage based tokens both rely on some element of economic system level trust; faith in its value is a self-fulfilling prophecy, an image which is backed by the company and all the resources and reserves it can muster to maintain it. This is a historical moment to watch which of these experiments fail, and why, and which of them rise up to become a global medium of exchange, a universal bearer token, perhaps even a money for the new world.

List of Companies Participating in the Survey

<u>Jibre!</u>	<u>SendGold</u>	<u>Xank</u>
<u>Rockz</u>	<u>Paxos Standard (PAX)</u>	<u>////Etch</u>
<u>Vault</u>	<u>Meld</u>	<u>Kowala</u>
<u>Onramp</u>	<u>X8</u>	<u>Topl</u>
<u>Globcoin</u>	<u>Saga</u>	<u>Algorand</u>
<u>Bitshares</u>	<u>Stably</u>	<u>Basis</u>
<u>The White Company</u>	<u>Stasis</u>	<u>Carbon</u>
<u>AAA Reserve</u>	<u>Stable</u>	<u>Corion</u>
<u>Sweetbridge</u>	<u>MakerDao</u>	<u>BitBay</u>
<u>HelloGold</u>	<u>Augmint</u>	<u>ORCs</u>
<u>Stronghold</u>	<u>Synthetix (formerly Havven)</u>	<u>Reserve</u>
<u>TrustToken</u>		<u>Aurora</u>
		<u>Stableunit</u>

Key observations about different stablecoins

Note:

This is based on the answers to the questionnaire from all the companies that participated. (Questionnaire is below)

Co-Authors: George Samman and John Shipman of PwC (based on the questionnaires completed)

General

- 1) Price volatility is one of the most significant obstacles in the adoption of cryptocurrencies for a number of reasons. Firstly, it keeps the currency attractive only for traders and speculators, not ordinary day-to-day users interested in using it as a medium of exchange because of its purchasing power changes wildly and it is an unreliable store for savings. Price fluctuations also cause enormous currency risk, as cryptocurrencies can depreciate or appreciate dramatically relative to fiat currencies, generating a loss for users who are holding cryptocurrencies and need to transact between cryptocurrencies and fiat. The loss can either be direct or indirect.
 - a) Direct in that the cryptocurrencies depreciate heavily against fiat and then users have far less in the bank.
 - b) Indirect when cryptocurrencies appreciate, in that a merchant's products are too expensive, making them uncompetitive or employee salaries and supply chain costs increase, reducing their margins.

Thus, there needs to be stability within a range of currency values for both upside and downside protection to protect incomes, savings, business margins and to allow for more reasonable business planning and forecasting when transacting or saving in this medium. Something akin to a buy wall⁷⁴ of a generic currency peg, which prevents the price of the currency from dropping and a sell wall⁷⁵, which prevents a large upward spike, is necessary to maintain a stable value of a cryptocurrency such that is comparable to fiat price stability. Only then will it be considered a legitimate medium of exchange and store of value by day-to-day users, merchants, and savers. It is also difficult for merchants or even simple peer-to-peer transactors to conduct business if there is no consistent measure of value for the cryptocurrency they would like to use. Volatility is what is keeping cryptocurrencies as a niche digital asset favored by speculators instead of a revolutionary technology that allows a decentralized and secure flow of money.

- 2) Most projects are currently built on top of the public Ethereum network. They are willing to change if issues around scalability and sharding are not fixed relatively soon. Some are building on other

⁷⁴ A buy wall happens when the amount/size of buy orders for a particular coin are much higher than the number of sell orders. Traders want to buy more than they want to sell.

⁷⁵ A sell wall is the opposite of a buy wall where there are many more sell orders than buy orders. This is price negative.

blockchains (EOS⁷⁶, Hashgraph⁷⁷, Dash⁷⁸, trialed Ripple⁷⁹Stellar⁸⁰ NXT⁸¹etc) and others have started by building their own blockchains (Bitbay and Algorand and Kowala and Topl).

- 3) The majority of the respondents are fiat backed in a 1:1 capacity followed by cryptocurrencies such as Ether or commodities such as gold. Others are backed by a basket of different currencies (fiat and/or crypto) where they are using different metrics and standards to decide the weightings. Topl and Algorand do not consider themselves to be stablecoins in the traditional sense as they are not backed by anything. Boreal is backed from revenues on a decentralized exchange IDEX.
- 4) Stablecoins are in the early development phase at this point in time and the design paradigms are still forming for what may be the future of money.
- 5) Most of these coins are stable and being tokenized versus the USD.⁸² Based on the responses the USD should be the most tokenized liquid asset in the cryptocurrency space over the next 12-24 months. The other categories are 1) other fiat currencies, 2) a basket of currencies, 3) commodities 4) cryptocurrencies and 5) indexes like the consumer price index (CPI) or a UN FAO Food Index⁸³.
- 6) Dual token models are being used in some cases. One token is a dividend paying or revenue share or a price appreciation token that trades on listed exchanges and the other is the token that is pegged to an underlying asset. Examples of this are Synthetix (formerly Havven), X8, Reserve, Staticoin and Sweetbridge. (Basis was going to do that)
- 7) Being stable⁸⁴ has different meanings for different people and there commonalities and differences in what is meant to the companies working to ensure stability. Generally, stability in a currency's purchasing power (which can be measured relative to an underlying asset or a basket of goods, say) is desirable so that it can function as a unit of account. The following show the range of responses:
 - a) Stable means that the coin can buy roughly the same amount of goods and services from one day to the next.⁸⁵
 - b) A stablecoin should be easily redeemable for the corresponding amount of assets it is pegged to.⁸⁶
 - c) Stable means easily predictable with respect to price outputs.⁸⁷
 - d) Stable = grows at the rate of local inflation - it keeps value in real terms.⁸⁸
 - e) Relative stability versus the volatility of other currencies. Stability must be relative to something else.⁸⁹
- 8) Revenue models⁹⁰ used by respondents (in no particular order):
 - a) Not for profit
 - b) Revenue/dividends
 - c) Network transaction fees which include workflow execution fees

⁷⁶ Synthetix (formerly Havven) & SendGold & Carbon

⁷⁷ Carbon

⁷⁸ Xank

⁷⁹ SendGold

⁸⁰ Stronghold, The White Company, Novatti AUD Utility Token, Fiapay

⁸¹ RYOcoin

⁸² Specifically, USD denominated deposits in commercial bank accounts.

⁸³ ////Pier

⁸⁴In one case, Augmint is using a DAO for stability.

⁸⁵ From Kowala questionnaire.

⁸⁶ From Carbon questionnaire.

⁸⁷ From Stableunit questionnaire.

⁸⁸ From Hellogold and Stably

⁸⁹ From Saga and Reserve.

⁹⁰ 4 of the projects label themselves as not for profit.

- d) Withdrawal fees
 - e) Vaulting fees in the case of Hellogold for the physical gold (this will probably become more common for other types of commodities as well)
 - f) Coin creation fees
 - g) Loan interest
- 9) The purpose of the stablecoin projects (as told by the teams) is to provide the next stage in digital money technology (Some of these may be contradictory) :
- a) To create a stable, decentralized cryptocurrency—permission-less digital money—that can be secured, saved, and sent instantaneously at almost no cost and with no specific intermediaries.
 - b) To be compliant and transparent (particularly fiat/asset-backed stablecoins)
 - c) To build trust that the stablecoin can hold its value and in the team behind it
 - d) To replace Tether as dollar backed models
 - e) To create financial access for those who are currently restricted
 - f) To become a medium of exchange and a reserve currency or a store of value

Launch & Marketing

- 10) Bootstrapping⁹¹ is vital as all of these projects require liquidity in the coin. This can be done through incentivizing miners as in the case of Kowala. The ability to convert between deposits in banks accounts and stablecoins are important as is being able to trade on exchanges. Financial transparency is essential in order to prove out the reserve, view transactions, and other information via smart contracts or be able to check on gold holdings or other types of assets. Redeemability at any time and any price is also necessary.
- 11) Stablecoins rely on attracting users and getting lots of users in order to have long-term viability. This is particularly true in the seigniorage model where platform growth is necessary to service the bonds. If growth in the number of users falls, the prices will fall and more bonds will need to be purchased making it more difficult to pay the interest on the bonds.
- 12) The following methods are being used to increase viability:
- a) Dual token models are being used so one can have capital appreciation of one of the tokens while the other token is pegged to an underlying asset in the project.
 - b) The models that are using baskets are trying to diversify currency risk by being stable versus a basket of different currencies and/or assets instead of just one
- 13) Confidence in the stability of the token will come through transparency in the code, in some cases the banking relationships, the ability for the technology to work openly and publicly, the ability for pegs to hold in times of stress, provable audits, provable reserves and accurate asset pricing models.

Economics

- 14) The performance of a stablecoin during worst-case-scenario market circumstances is one of the most important components of a stablecoin system. Black swan events must be prepared for by managing the peg and providing stability during times of extreme stress. Being decentralized and having provable reserves mitigate many risks but with all scenarios, it is unforeseeable that is hardest to prepare for.
- 15) The capital for maintaining the exchange rate for the respondents to the questionnaire mainly comes from:
- a) Market makers
 - b) Holders of the (unstable) coin: in the case of crypto collateralized the users overcollateralize the system
 - c) Currency auctions
 - d) Regulated financial institutions
 - e) Banks
- 16) Having an eventuality plan in case of a “black swan” event is critical. Death spirals and positive feedback loops can lead to a crisis in confidence in the stablecoin that would be irrecoverable. Even an event with a 1% annual probability of occurrence is inevitable and can occur without knowing the cause until after the fact. Most have proprietary stabilization mechanisms in place or use 1:1 backing so even if the price went to .01 it would still be redeemable according to the projects. Emergency shutdown procedures can

⁹¹ Bootstrapping is the process of starting with very little at minimal costs with the intended goal of building out a network to a large size.

be used in some cases as well. Risk diversification is also a tool being deployed particularly by the companies using baskets.

- 17) Any pricing model must be robust enough to withstand a black swan event where all token holders sell at the same time. The reserve must have enough money in it pay back everybody in this unlikely scenario.

Technology

- 18) Since most projects are built on Ethereum and use Solidity, formal verification⁹² is not an option. If these projects move to other protocols in the future they will be able to use formal verification if the smarting contracting language allows for it. All the stablecoin projects in the survey are using smart contracts with most fully automated and some semi-automated.
- 19) Formal Verification of smart contracts appears to be an underexplored area due to limitations of Solidity code. If these limitations are overcome it will become a necessary inclusion, particularly around verifying components needed for stability.
- 20) Tradeoffs: Balancing stability with the benefits of decentralization of cryptocurrency is one of the biggest dilemmas inherent in the structure of stablecoins. The trade-off occurs because pegging a cryptocurrency to fiat currency involves holding reserves of fiat in a central bank or vault or a commercial bank, right, like the current class of USD depository receipts.. Thus, there is no longer a trust minimized system because users must trust that the coin issuer has adequate fiat in the bank to back the value of the coin. Also, cryptocurrencies backed by fiat or other cryptocurrencies still have price information that is not linked to the underlying cryptocurrency. For example, priced in USD/Euro showing Godelian incompleteness. In both cases, the cryptocurrency is reliant on a central entity to ensure its value. This is either a bank or information source, which re-introduces centralization into the equation. The first system, built on centralized banking trust, loses the original vision of using cryptocurrencies as a free transfer of value without being subject to control and limitations bound to government-approved identity and affiliation. In order to create stability, the fiat collateralized tokens have compromised on decentralization.
- 21) Oracles are an additional tradeoff. Many projects require off-chain information to be brought on-chain. Until a fully decentralized oracle solution is built these projects will have to use a centralized Oracle in its place.
- 22) Transaction throughput is limited by the protocol and since most are building on Ethereum that limits TPS (transactions per second) to ~15 per second. Most are hopeful for scaling solutions from Ethereum or looking to build on multiple protocols or they are creating their own in case this is not solved. For those building on other blockchains (eth fork, EOS, Stellar, and Hashgraph) thousands of TPS are being claimed.
- 23) Use of oracles: There are several projects using oracles for management of external prices and other information. Approximately 60% are using oracles. Oracles are a centralized component for any stablecoin project today but most will look and transition to decentralized options as they become available.
- 24) Stablecoin designs must balance between three features: stability, decentralization, and scalability. Stability is how stable an asset is with respect to a defined base and has two components: the average volatility of the asset, and the worst-case volatility of the asset (how resistant the stablecoin is too significant market downturns). Decentralization is a measure of the degree of trust in an entity to ensure the stability of the stablecoin. Scalability is the number of transactions per second but could have a secondary definition which refers to the number of tokens that can be minted.
- 25) There is an evolution of thinking and technology around the use of full, pseudo or zero anonymity for those people or organizations using tokens. Some central banks have considered tokens that replicate 'cash in your pocket' - that is, complete anonymity. Whilst public adoption would be significant, this is at odds with stopping the cross-border use of these pegged tokens to avoid money laundering issues. True decentralists like Bitbay and Orcs only subscribe to this direction in our initial analysis.
- 26) Demand-based models mint and burn tokens based on demand. Tokens only get created when there is demand, so as demand grows tokens do with it. Once supply goes down (ie a token is redeemed), the token is burned.
- 27) Most stablecoins are built on Ethereum so transactions are public. Bitbay keeps transactions private except between counterparties and Jabril anonymizes identity.
- 28) Many of the projects have centralized governance, with an entity issuing the coins and dealing with other centralized entities such as managing the banking relationships. The compliance element and vault selection also tend to be centralized.

⁹² Formal verification is the act of proving or disproving the correctness of smart contracts with respect to a certain formal specification or property.

Regulation

- 29) Stablecoins are regularly subject to regulation. For example, AML/KYC is being implemented by many of these companies which increases the barriers to entry for those who want to hold and use stablecoins. This is antithetical to a global money system as access and accessibility are key attributes for a reserve currency.
- 30) Regulation is still in the early days and most companies are willing to embrace regulation with the view that they are getting/will get a better response from regulators than other types of cryptocurrencies. AML-KYC is being embraced as a key lynchpin to trust for many of the stablecoin projects particularly fiat/asset-backed projects. They also believe clearer global coordination and guidance from regulatory bodies is severely lacking and needs to be addressed. This response should also be harmonized rather than fragmented within jurisdictions.
- 31) Currently, there is no financial reporting framework that allows for audit conformity of a stablecoin. This means that in today's world performing an "audit" isn't possible. One must instead rely on a 3rd party to attest to whether the 1:1 peg is accurate.

Testing

- 32) The testing and modeling are mainly being done by non-collateralized seigniorage coins, algorithmic-based and those that are trying to use baskets for stability.
- 33) Agent-based modeling⁹³ and Monte Carlo simulations⁹⁴ are for those projects that are testing their models.

Key Observations

- 34) Fiat-backed stablecoins need to establish banking relationships in order to hold the currency that the stablecoin is backed to. The problem is large multinational banks won't do this for cryptocurrencies due to compliance risks so it falls on the shoulders of small regional banks which have high failure rates themselves to bank these projects. With some of these fiat-backed stablecoins being backed to hundreds of millions of dollars, this poses substantial solvency and credit risks. (eg Tether)
- 35) While many of survey respondents' stable coin projects are 1:1 backed to digital assets, as markets take confidence in the liquidity and safety of these new stable digital currency markets, for better or for worse, the ability to move to fractional reserves will become a reality. For example, Saga's building in of monetary evolution from full to fractional reserves.
- 36) An associated set of ancillary services will also need to evolve around the validation, certification, and reconciliation of these reserves to digital assets. Accountancies will need to evolve to offer digital asset to physical asset audit services for stablecoins (whether this is a currency or a physical asset such as gold or iron ore or wheat).
- 37) Many of these projects are not just looking to see their stablecoins to be used for trading in the cryptocurrency ecosystem but to actually compete with fiat currencies on a global scale. In order for this to happen, stablecoins will need to be censorship-resistant.
- 38) Fiat-backed stablecoins can never be censorship resistant, permissionless and trustless. However they do have substantial benefits versus fiat currency because they are programmable (both for money and compliance) and easily transferable.
- 39) Most of the key innovations will come from crypto-backed and algorithmic backed/seigniorage based stablecoins

⁹³ An agent-based model (ABM) is a class of computational models for simulating the actions and interactions of autonomous agents (both individual or collective entities such as organizations or groups) with a view to assessing their effects on the system as a whole.

⁹⁴ Monte Carlo simulations are used to model the probability of different outcomes in a process that cannot easily be predicted due to the intervention of random variables. It is a technique used to understand the impact of risk and uncertainty in prediction and forecasting models.

- 40) One of the key focus areas for stablecoins achieving their stated stability goals will be to be able to create baskets of uncorrelated assets.
 - 41) A whole new industry is beginning to form around stablecoins-ancillary plays like Corion X and Standard.one aka Cement. Dao (CementDAO creates a decentralized ecosystem of stablecoin rating agents. The community of BUILD token holders vote to whitelist the “best” stablecoins, allowing them to be added to a diversified basket.)
 - 42) Presently there are over 75 projects that can be considered “stablecoin” projects. With the deluge of projects and the amount of capital they have raised, the cryptocurrency space could enter into its own form of quantitative easing. As all this money enters the ecosystem (via fiat or asset-backed) it could find it’s way into investing into many of the cryptocurrency projects trading on exchanges.
 - 43) Exchanges are hedging themselves against a tether failure and adding new fiat-backed (USD mainly) stablecoins onto their exchanges almost daily now. (Okex and Huobi have added 4 more stablecoins recently to hedge and surely others will follow)
 - 44) Gemini USD and Paxos Standard (PAX) Stablecoins, are the most highly regulated of all the fiat-backed/ asset-backed tokens. They are subject to the terms contained in the source code which include the right of forfeiture or seizure if required by law enforcement.
 - 45) It appears we may be entering bubble phase for stablecoins.
 - 46) Stablecoins should not be equated with the asset they are backed by in terms of safety and stability. The legitimacy and viability of these stablecoins will be at the whim of investor expectations. Understanding what these coins truly represent and their functionalities is a must for anyone who is looking to deploy capital into stablecoins.
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Questionnaire

Note: you can decline to answer certain questions (like marketing / go to market) which may be trade secrets and we will put in “declined to answer due to current trade secret”.

- a. General
 - i. Which blockchain / DLT are you building on top of?
 - ii. How does the stablecoin work?
 - iii. What is the purpose of your coin? What does it aim to achieve and which problems does it solve?
 - iv. When we say something is stable what do you think it means? And when it comes to monetary policy specifically?
 - v. What is your revenue model?
- b. Launch & marketing
 - i. What does the market need to be confident in the stability of your token?
 - ii. How are you bootstrapping to that level of confidence?
 - iii. What are your go-to-market strategies?
- c. Economics
 - i. What is your coin stable with respect to?
 - ii. How much volatility can this peg withstand? Is that the same for upwards and downwards pressure? How wide is the band of behavior it can support?
 - iii. How easy is it to analyze the band of behavior from which it can recover?
 - iv. How expensive is it to maintain the peg/stability mechanism?
 1. How transparently can traders observe the true market conditions?
 - v. Which monetary theory (theoretical) assumptions do you think are not true and how does your protocol account for that?
 - vi. Does your stablecoin supply scale in response to demand? If so, how?
 - vii. Who provides the capital to maintain exchange rate peg? How are they compensated / Why do you think they would continue to lock up capital, given other investment opportunities?

- viii. An eventuality plan in case of a “black swan” event.⁹⁵ The 1% case will happen eventually.
- d. Tech
 - i. Are any novel consensus mechanisms used, over and above the underlying blockchain?
 - ii. What transaction throughput can the blockchain currently handle and how does it plan to scale? Do its plans coincide with your plans for your estimated demand?
 - iii. What tradeoffs does your protocol make and why did you make those tradeoffs? (supply/ demand, temporarily peg breaking) (censorship resistance) (privacy tradeoffs) (accuracy of present market data and ease of manipulation of the data feed protocol uses (responsiveness of market and ease of manipulation)
 - iv. Are there any centralized components of your system? Would any of these be easy for govs to shut down?
 - v. Does your protocol require information outside the blockchain such as a feed of price data? If so, how does this oracle work? Who manages it, what are the incentives for managing it, and what happens if the data they provide has a glitch?
 - vi. Which participants can see which transactions? What is the data and metadata available, and to whom? How does this impact privacy?
 - vii. Are you doing anything with formal verification? Smart contracts used?
 - viii. What is the rebase period? (Length of time between currency adjustments.)
 - ix. Can we make this automated?
 - 1. Do we use a smart contract or network rules of the blockchain operators?
- e. Regulation
 - i. What are your perceptions of local and global regulation in supporting stable coin, asset-backed token economies?
 - ii. What could be done to improve regulation in terms of speed, quality, value for your company?
- f. Testing
 - i. What kind of simulations have you done and what have they helped you learn? (simulating a broad array of market conditions)
 - 1. Mental models for simulations
 - 2. Econometric models
 - 3. Agent-based Modelling / Computer simulations
 - 4. Other (Please describe)

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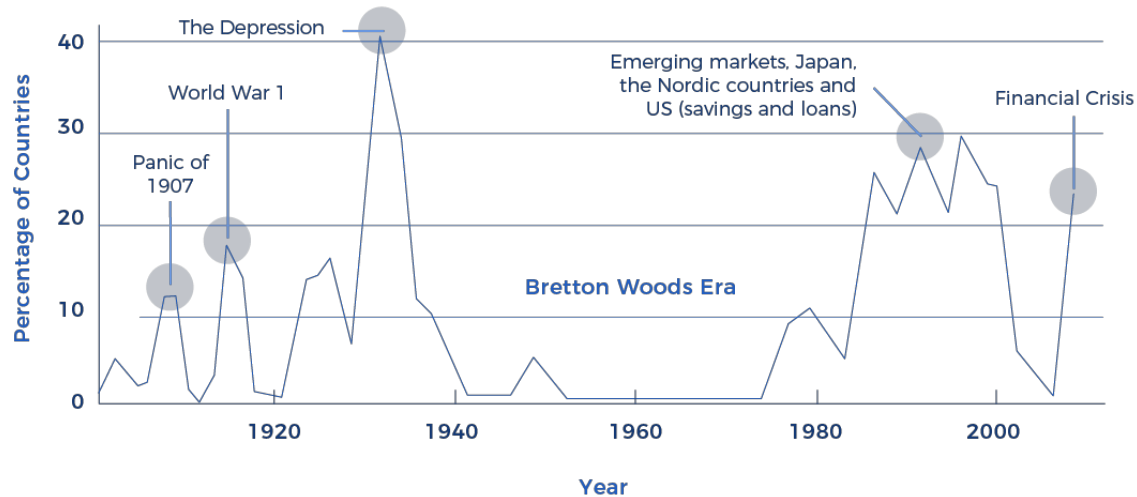
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APPENDIX 1

Special Breakout Section on Bretton Woods ⁹⁶

**PERCENTAGE OF COUNTRIES WITH BANKING CRISES (1900 - 2008)
WEIGHTED BY SHARE OF WORLD INCOME**



Source: Reinhart & Rogoff Banking Crises: an Equal Opportunity Menace (AEA 2008)

History

The international monetary system that arose from the conference at the Mount Washington hotel in Bretton Woods, New Hampshire in 1944 was one of the most significant historical and economic developments of the 20th century. Currencies sit at the centre of international relations and the relationships between currencies under the Bretton Woods system, as is typical for international monetary systems, reflected and reinforced the Realpolitik between the key nation states (mainly the UK and US at the time of its formation).

The impacts of Bretton Woods would last longer than the system itself and would go a long way to anchoring the American Century and the Pax Americana. Even today the international monetary system might best be characterised as the remnants of the Bretton Woods system. This post-Bretton Woods system has now existed for twice as long as Bretton Woods proper and has proved to be surprisingly resilient if not optimal for all parties or particularly stable for many countries. Needless to say, establishing an international system by collecting what is left over from a failed earlier system may not be the ideal way to ensure optimal currency system outcomes.

Bretton Woods from a technical perspective was an agreement between the signatory nations to establish two institutions - the World Bank, best understood as in fact a development fund, and the International Monetary Fund (IMF) conversely best understood as an international central bank. Under Keynes' model, the IMF would indeed have had its own currency to assist in this central bank role, the introduction of the Special Drawing Rights (SDRs/XDRs) in 1969 was seen as a step in this direction, although at this stage has been largely unsuccessful. At this time SDRs are now a unit of account used by the IMF and defined in relation to a basket

⁹⁶ Written by Damian Jeffree from Soveren

of currencies in a value expressed in US dollars. In practical usage, US dollars remain the currency of choice for international payments, and SDRs are little used for a number of technical reasons.⁹⁷

The currency element of the Bretton Woods agreement was a requirement to keep participating currencies pegged to the US dollar or gold. The US dollar and gold were seen by the head of the US delegation as equivalent and were to have a fixed exchange rate of USD \$35 an ounce. This became impossible to maintain over time. The allowable variance from the peg between the other currencies and the US dollar was one percent for spot transactions and an IMF approved range for other transaction. Countries were required not to sell or buy gold outside the relevant range.

Countries were at liberty to move their pegged value within ten percent of the initial value without the approval of the IMF, and to request IMF permission for changes within another ten percent which would be approved or rejected within 72 hours. Further moves would be considered by the IMF but with no deadline for a decision. Failure to follow the rules would disqualify the member from the use of the IMF resources.

The forces that brought together the Bretton Woods conference and then the agreement were immense and unlikely to be soon repeated, being the then impending American victory in World War II. Most other participants in World War II had lost the war, either outright in the case of the Axis powers or in view of the enormous toll paid for victory on the battlefield by many of the allied countries. Economically Germany, Japan, and Italy were ruined, but so were Britain, France, China, and the Soviet Union.

The British had been forced by the US to agree to the dismantlement of their Empire and were heavily indebted to the US for the lend-lease program, with a debt-to-GDP ratio of 240% by the end of the war. Secretary of the Treasury Henry Morgenthau Jr enforced an aim of US political policy which was to ensure Britain had little left before any US aid was provided. In part, this was to ensure the passage of the Lend-Lease Bill through Congress, a difficult challenge in an internationally cautious US of the time. While the challenge of Congress was real, Keynes challenged that the program was designed to maximise “[Morgenthau’s] future power to impose his will on us”.

Ultimately the US held a large proportion of the world’s gold by 1943 as planning for the post-war world began, and as a result, was in an extremely strong bargaining position to determine the shape of the international currency system. The initial agreement at Bretton Woods was between the US and Britain. Britain had, prior to the war, been the centre of international finance. While Britain in 1943 was effectively bankrupt and was soon to be dependent on large post-war loans from the US for rebuilding, its agreement was still probably necessary to legitimise such a large shift of power across the Atlantic.

US negotiations at the conference were led by Harry Dexter White, who it has since been alleged - based partly on an FBI investigation into cables he sent to a confessed Soviet spy - was passing information to the Soviets. White would also argue for the provision of money printing plates to be available to the Soviets for use in East Germany, which, as the notes they produced were exchangeable for US dollars, were quickly abused at enormous cost to holders of US dollars.

The UK delegation was led by John Maynard Keynes, the prominent economist. Keynes came armed with a plan for a common international reserve money - Bancor (French for ‘bank gold’). Bancor was to be a balance of payments clearing currency but one that would have led ultimately to an international common currency that would largely replace gold. Bancor could be created with gold but could not be redeemed for gold. By this one-way mechanism, it would have removed large amounts of gold from usage in international payments, although it would still have had an invisible role underpinning confidence in Bancor.

White was determined to place the US via the US dollar at the heart of the international system. To do this, US dollars, as a result of the US gold holdings, were to be a proxy for gold in the proposed system. International holdings would be largely in US dollars but these would be redeemable by participating governments for gold.

The system was to recreate the stability of a gold standard system but without the limitations of that system. It would create enormous privilege for the US in the process. In 1965 French President De Gaulle would accuse the system of being “a credit instrument reserved for one state only”.

⁹⁷ Special drawing rights are a unit of account, not a true currency, have very few institutions that can deal in them (the “official holders”), require conversion to a national currency for use (which requires finding a buyer for them), take several days to convert, are relatively illiquid compared to national currencies due to limited issuance, are fully IMF administered for government purposes only, have no central clearing house, there are no securities denominated in SDRs, etc.

The system would be both enormously successful for a period in dramatically stabilising international currencies and banking before completely failing as a result of deeply embedded flaws that were present from the beginning.

There was, according to recent historical accounts of the conference and events around it, essentially no negotiations or concessions of substance entered into by the US. The US at the time of the conference was not yet magnanimous in impending victory. Keynes' system, which did not share the flaw of White's system was shelved and White's system was adopted essentially without change. White also disapproved of what was to become the generous and visionary Marshall plan, instead insisting on an austerity that quickly threatened a "world economic crisis". White supported instead 10 billion dollars in unconditional reconstruction credits to the Soviet Union, from today's perspective an extraordinary position. Fortunately for the prosperity and stability of the free world White's plan was quickly dumped in favour of the Marshall plan. White himself fell out of favour as he came under FBI investigation for his Soviet links.

The flaw in Bretton Woods was the Triffin Dilemma which will be discussed later in this paper. Briefly, Triffin, a Belgian economist, identified that the use of a national currency as the international reserve currency would not work for an extended period as it would require ever-increasing money creation (to reflect international growth) by the national currency at the centre of the system, in this case, the US dollar. This would require increases in the gold reserves held to maintain the fixed convertibility to gold of the US dollar promised by the system.

In practice, foreign countries would accumulate US dollars which would be then lent back to the US increasing US indebtedness. To maintain stable convertibility this then required the US to increase its gold holdings. But to do so creates a global reserve currency 'shortage' that needs to be addressed to allow for global growth without deflation. To not do so allows the growth of US dollars needed for global growth but on a base of relatively fewer gold reserves, which makes maintaining a stable rate of convertibility at first unconvincing to other participating governments and eventually impossible. This flaw was not shared by Keynes' Bancor proposal.

These structural problems combined with increased US spending in the 1960s on social programs and the war in Vietnam, led to the claim US dollars could be converted to gold by foreign governments, as required by the Bretton Woods agreement, on an ongoing basis being increasingly unconvincing. By 1970 the US held only 22% of gold reserves against foreign government US dollar holdings, down from 50% a few years earlier.

Requests for a revaluation against gold were made by Britain to President John F. Kennedy as early as 1962, which if acceded to perhaps may have allowed time for a restructuring of the system that would have avoided the inevitable outcome of the Triffin Dilemma. Concerned about the convertibility De Gaulle ordered the French central bank to demand only gold payments in 1963.

John Connally was appointed Secretary of the Treasury under Nixon. Soon after his appointment he famously told European countries the US dollar was "our currency but your problem".

Connally convinced Nixon to abandon the Bretton Woods agreement stating, "My philosophy is that all foreigners are out to screw us, and it's our job to screw them first." In 1971 the Bretton Woods system effectively collapsed when the US 'temporarily' suspended redemptions of US dollars by foreign governments for gold. It was later made permanent. This was done without consultation of the Bretton Woods signatories or even the State Department and became known as the Nixon Shock.

Foreign governments had their rightful claims under the Bretton Woods agreement to the redemption of US dollars for gold under the system denied without notice, they were in Connally's words 'screwed'. The US dollars they were left holding were not worthless but over the next four years would lose 74% of their value compared to the gold they represented under Bretton Woods. While notification would have no doubt led to a rush of redemptions and therefore would have been unworkable, a fairer conclusion to the system could have been negotiated.

The US Government was in effect acting as trustee for the participating nations gold reserves under Bretton Woods. By closing the gold window it broke this trust and took ownership of this gold that under the agreement belonged to foreign governments. One implication of this act for currencies today is that national governments should not trust foreign governments, including the US Government, with their currency reserves at least when intermediated by their national currency and perhaps more generally. While Nixon's actions were inimical to the intentions of the designers of Bretton Woods they were rational responses to a failing system that preserved the bulk of wealth for the trustee of the system.

Reinhart and Rogoff (2009) observed of the aftermath of Bretton Woods “The break-up of the Bretton Woods system of fixed exchange rates, together with a sharp spike in oil prices, catalyzed a prolonged global recession, resulting in financial sector difficulties in a number of advanced economies”. This was the era of stagflation and economic decay, the messy social and economic decay of the 1970s duly ensued.

During the Bretton Woods period analysis by Reinhart and Rogoff suggests an extended and exceptional period of minimal or no banking crises in any country globally. Their analysis runs from 1800 to 2009 and this period is the only period of such global banking stability. Banking crises are enormously costly events for countries, their avoidance for a quarter of a century is very significant in global terms. It is likely this stability albeit fleeting that continues to drive calls for a new ‘Bretton Woods’ type agreement, particularly at times of dislocation.

Analysis of the successes and failures of the post-Bretton Woods monetary system following the initial malaise of the 1970s is beyond the scope of this paper. At a high level, it is probably fair to say that it has been mixed.

The system overall has worked well for the most prosperous nations whose fiat currencies command the trust and critical mass to make them perform well. Even for these countries there have been increased numbers of banking crises, currency volatility, and concerns around manipulation of exchange rates by trading partners. But these costs have likely largely been offset by the Keynesian flexibility of purely fiat currencies to increase aggregate demand through monetary policy when required.

For the great majority of nations, the picture is very different. Their currencies are often an ongoing source of instability and a barrier to the confidence of investors. Some countries have patterns of currency inflation and collapse due to the fiat nature of their currencies. Venezuela is a particularly egregious example of this pattern of currency-driven weakness. Despite enormous oil reserves the country is unable to realise its wealth and its series of collapsing currencies contribute significantly to this outcome.

Many smaller nations are required by the post-Bretton Woods system to either issue their own currencies, which realistically are doomed to weakness or to rely on an imported currency such as the US dollar. Dollarization as the adoption of the US dollar is known, is very expensive both in respect to seigniorage and a practical costs for these typically poorer countries.

The lessons of Bretton Woods

The lessons of Bretton Woods and its aftermath are many. Some are obvious such as the noted one that central banks cannot trust foreign governments with their currency reserves. Others are less obvious.

While the impact of Bretton Woods is subject to debate, the fact that there was a substantial net benefit is not in doubt. Generally, Bretton Woods demonstrated some of the benefits of a globally coordinated stable monetary system, benefits that are so significant that there are still periodic calls for a ‘new Bretton Woods’ 45 years after its demise.

To achieve its benefits Bretton Woods created a raft of stable reliable currencies, albeit only for a period. These linked currencies can be thought of as creating a quasi-common global currency. While this arrangement did not realize the full potential benefits of a true common currency, such as shared financial services, the benefits realized were significant. Some of these benefits are discussed below.

Financial system stability

The stability of the common currencies was a boon for financial stability for the various participating economies (US pressures due to the Triffin dilemma notwithstanding) and the wider world. If the system had been put on a more sustainable footing these benefits could have continued.

Monetary stability creates economic benefits in and of itself. A stable monetary environment encourages investment and supports long term business planning. These benefits support the economy. Bretton Woods’ association with avoiding banking crises amplifies these benefits. The outcome for citizens is increased prosperity and the avoidance of costly disruption and economic malaise associated with banking crises.

Enhanced trade and increased welfare

The raft of linked currencies were more predictable and efficient and went a long way to minimising frictional costs associated with trade.

This avoided, to some extent, the costs and barriers to trade that normally accompany having national currencies. Rose and van Wincoop (2001) note “National money is a barrier to international trade. Accordingly, currency unions have lower trade barriers, more trade, and higher welfare.”

Sound domestic currency options for smaller countries

The fiat system that replaced Bretton Woods shifted the foundation of national currencies firmly and wholly onto the credibility of national governments and their central banks. While, as discussed, this worked quite well for the larger and more established economies with credible governments and central banks. Unfortunately, the great majority of the countries of the world did not meet these necessary criteria.

Small countries, particularly those that are developing, could have benefitted from participating in a linking system such as Bretton Woods.

Some of these countries manage their affairs today so as to have a fair amount in common with the original Bretton Woods system. A periphery of countries use quasi-currency pegs to the central country’s currency (again, for the moment, the US dollar) to gain economic growth through increased exports and labour deployment to this end. This system has been described as Bretton Woods II. Stability is the ultimate aim of these developments.

There are still many countries that do not meet the necessary criteria for successful currencies and are without the ability to establish credible pegs, that are left with currencies that are destined to underperform or fail.

Avoided currency wars and support for export-led growth

The US dollar has remained the global reserve currency, partly due to the petrodollar system in which oil purchases from Saudi Arabia were agreed to be made in US dollars, some of the benefits of a shared currency have remained but in a reduced way.

The post-Bretton Woods system has given the most credible governments greatly increased flexibility in dealing with shocks due to the ability to devalue their national currencies. However, the twin of this freedom is the risk of devaluation wars, a constant curse in the post-Bretton Woods era.

APPENDIX 2

These are recent charts of Ethereum and Bitcoin volume. Over the past month volatility has dropped dramatically.⁹⁸

⁹⁸ <https://diar.co/volume-2-issue-43/>

