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# **SAFE HAVENS:** How gold and bitcoin can adapt to a new paradigm

WITH



**Valiendero**  
**Digital Assets**



## CONTENTS

<b>Executive Summary</b>	<b>4</b>
<b>Complex Dynamics</b>	<b>5</b>
Contagion	6
What is a systemic threat?	8
Risk Versus Resilience Strategies	10
<b>The Contagion of Economic Narratives</b>	<b>11</b>
The historical context of narratives in bitcoin	14
The cyclical nature of narratives	15
The conclusion of a 20th century narrative epidemic?	17
<b>System Resilience Assessment</b>	<b>18</b>
Gold's dependencies and systemic risks	20
Crypto Industry Systemic Risks	21
Resilience Matrix	23
<b>Current Economic Paradigm at a Tipping Point?</b>	<b>25</b>
Pre-Coronavirus Economic Cycle	26
Post-Coronavirus Economic Cycle	28
Store of value assets	31
Gold	31
Recent Performance and the Future	33
Bitcoin	35
Historical returns and correlation	35
Fundamental Growth	36
<b>Quantifying Bitcoin as an Emerging Store of Value</b>	<b>38</b>
BTC as medium of exchange	38
BTC as a store of value	39
Comparative BTC Days Destroyed	39
The declining velocity of bitcoin	41
Stock to Flow Ratio	43
Pre-Coronavirus Behavior in 2020	45

<b>Macroeconomic drivers for stores of value in the coming recession</b>	<b>47</b>
Gold Valuation Drivers	48
Economic expansion	48
Risk and uncertainty	48
Momentum	48
Opportunity cost	49
Demand	49
<b>Bitcoin's resilience going forward</b>	<b>50</b>
Minimal Correlation and Systemic Contagion	50
Outside the Speculative Credit Scheme	51
Centralized Exchanges Percentage of Outstanding BTC Supply	53
Growth of Decentralized Exchanges	55
Pension and Retirement Funding Shortfall	55
Summary	57
<b>Author Bio's</b>	<b>59</b>
Andrew Gillick	59
Christopher Brookins, Valiendero Digital Assets	59
<b>About BNC Research and Consulting</b>	<b>59</b>

## Executive Summary

Despite the growing narrative of bitcoin being uncorrelated with any other asset class and becoming a safe haven store of value, its performance over the past two weeks has proved otherwise and reminded us that low correlation doesn't always imply independence.<sup>1</sup> We acknowledge that bitcoin has performed in no way like a traditional safe haven and that correlation is a poor metric of dependence in financial markets due to the presence of fat-tails.

However, this report starts from the premise that COVID-19 has triggered tipping points in a global system that is stretched in all directions and that cascade effects are just beginning:

- 1) **economically:** corporate and sovereign debt at all-time highs, the longest asset bull run, correlation of disparate asset classes, breakdown of globalization and neoliberalism
- 2) **environmentally:** limits to the traditional growth model, hottest years on record, highest CO2 on record, devastating bushfires in California and Australia, rise of climate refugees
- 3) **socially:** global wealth inequality gap at 1930s level and given rise to populist politics and social unrest (e.g. Yellow Vests in France, Chile) and the potential of a pension crisis in US
- 4) **politically:** The breakdown of multilateral cooperation internationally and the rise of corporate interests influencing national politics; more rivalrous geopolitics

We explore the resilience of both bitcoin and gold in the last phases of this Black Swan event to *recover* and *adapt* to a new system state. The exact outcome of this regime shift is difficult to predict but we lead on historical precedent (US economy in the 1930s and QE in Japan in the 1990s/00s) and events that are already occurring, namely negative interest rates, the removal of cash and 'QE infinity' announced by the Federal Reserve.

Rather than make price predictions for either bitcoin or gold, we explore bitcoins' emerging use as a store of value - especially after the May halving event - it's exposure to contagious narratives and the macroeconomic drivers for store of value assets during this recession. From there we reason using a semi-quantitative methodology, the resilience matrix, what the strength of each is.

We posit that the traditional vision of a 'safe haven' will also change in this new paradigm of negative interest rates, money printing and cashless economies. Indeed this breakdown of systems is what numerous millionaires and **billionaires** have been preparing safe haven bunkers for in New Zealand, a country renowned for its political stability and pristine environment. We believe similar system-thinking to safe havens is relevant even to those who aren't billionaires - whether it's land, precious metals, rare earth minerals, digital assets or even fresh water.

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<sup>1</sup> Embrechts, Paul & McNeil, Alexander. (2000). *Correlation And Dependence In Risk Management: Properties And Pitfalls*. Rev. Econ. Stat.. 86.

## Complex Dynamics

First a brief introduction to the literature on complex systems.

Complex dynamics is the study of large systems that are in non-equilibrium states; in other words, they are out of balance, unpredictable and are present in all natural systems of organization. They may often look 'chaotic', but complex systems arise in all natural and social organizations, ecosystems, the solar system, human cells, the economy, and society generally.

This seeming order out of chaos is also known as 'spontaneous order' or self-organization in the scientific fields of biology and physics. Austrian economist Friedrich Hayek<sup>2</sup> is renowned for applying the theory of spontaneous order to economics; which is to say that financial markets are the result of human action but not of human design.

Our systems are made up of many smaller parts (or nodes) that have many nonlinear interactions with each other, which creates the whole and adds to its resilience as any number of these can be cut off without affecting the whole system.

According to the Stockholm Resilience Centre, financial markets **share the three characteristics** of complex dynamical systems:

- highly unpredictable, due to their non-linear relationships / interactions
- contagion effect, things can spread very quickly and tends to display a fat-tailed probability distribution of high-impact events
- modularity, although the whole system is well-connected, parts of the system are more connected within than between, which may help its resilience.

However, complexity theory is the opposite of our prevailing financial models and theories which are premised on equilibrium models of how the economy works<sup>3</sup>. And although economic resilience is a strategy considered by central banks in macroeconomic policy, it is premised on it always returning to a natural 'equilibrium' state via interest rate adjustments to keep inflation and GDP growing within a prescribed band.

Modern society proceeds on the assumption that a number of complex systems will work reliably, both individually, and in their interactions with other human and natural systems. And while this

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<sup>2</sup> <https://academic.oup.com/ej/article-abstract/78/312/903/5235953?redirectedFrom=fulltext>

<sup>3</sup> Keen, Steve. 2011. *Debunking economics - revised and expanded edition: the naked emperor dethroned?* London: Zed.

bold assumption generally holds true,<sup>4</sup> our heightened connectivity across geographies, cultures, and markets, has shifted the capacity of the global economy to absorb shocks.

According to Taleb<sup>5</sup> (2020), expectations of harm or risk to the global economy based on historical events are underestimated both because events are inherently fat-tailed and because the tail has become fatter with increased connectivity. In other words high impact, low probability events are becoming more probable.

Thus it is highly unlikely that the previous models and strategies that our economy and markets have been premised on for decades will be applicable in a new system state. We posit that a better approach to choosing a safe haven asset in the 21st century is to pick the one with more resilient traits to new equilibria (or threat agnostic) rather than what traditionally worked in previous decades.

A resilience approach accepts that transitions to new phases are part of its nature and the system will not return to some previous equilibrium and we posit that bitcoin will be better positioned than gold as a safe haven for this transition to a new state after the coronavirus increases the fragility of the global system.

Throughout the decades of globalization the global economy's trade and foreign exchange flows have become highly fragmented operationally but more centralized and interconnected. Similarly, we will show that gold as a safe haven, is more closely connected to the wider financial system that we are trying to protect from when compared to bitcoin, and that it lacks many of the traits that make it adaptable to 21st century needs and demands.

## Contagion

The issue of contagion is ultra-topical given that we are witnessing the rapid spread of the coronavirus (COVID-19) pandemic.

As noted earlier one of the traits of complex systems is the transmission due to high connectivity which can tend to display fat-tailed distribution<sup>6</sup> of risks. As Taleb (2020) notes, "global connectivity is at an all-time high, with China one of the most globally connected societies."

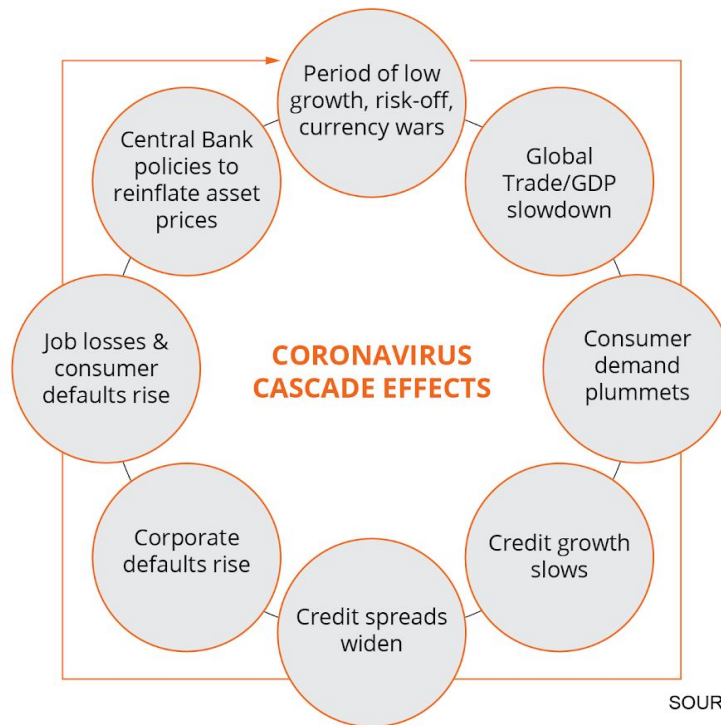
China is now emerging as a single point of failure in the world's supply chains growth during the coronavirus pandemic.

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<sup>4</sup> [https://www.oecd.org/naec/averting-systemic-collapse/SG-NAEC%282019%295\\_Resilience\\_strategies.pdf](https://www.oecd.org/naec/averting-systemic-collapse/SG-NAEC%282019%295_Resilience_strategies.pdf)

<sup>5</sup> <https://necsi.edu/systemic-risk-of-pandemic-via-novel-pathogens-Coronavirus-a-note>

<sup>6</sup> Joseph Norman, Yaneer Bar-Yam, and Nassim Nicholas Taleb, *Systemic risk of pandemic via novel pathogens - Coronavirus: A note*, New England Complex Systems Institute (January 26, 2020).



Due to the heightened connectivity in the world (information, transport, trade) contagion spreads through our systems at an ever faster rate, whether it's a virus, fake news or a currency crisis. Today we have a potent mix of information and narrative virality which further compounds the impact of epidemics.

A system can have either high internal connectivity within the system or externally with other environments, or both, which impacts its contagion rate. We posit that bitcoin has high internal connectivity between its constituent parts but relatively low external connectivity to the wider economy, whereas gold has both high internal and high external connectivity to the wider economy.

Bitcoin and gold's internal and external price dependencies			
BTC		Gold	
Internal	External	Internal	External
Miners	Spec traders	Miners	Fund/ETF industry
Validators	Exchanges	Refiners	Custodians
Nodes	Long-term investors	Smelters	Underwriters
Chipmakers	Venture capital/funds	Producers	(Re)insurance
	Early adopters		Jewellery
			Technology
			Central Banks
			Long-term investors
			Spec traders

A system can become more resilient to shocks the stronger the internal dependencies are *within* the system, rather than *between* external systems<sup>7</sup>. Although both gold and bitcoin share similar internal dependencies, demand for bitcoin and its growth as a network is not necessarily premised on GDP growth and, we posit, therefore not as prone to the machinations of corporate and political interests. Gold's use in technology is directly linked to GDP growth, via demand for electronic goods and smartphones.

Unlike gold, however, BTC price is inelastic as it has a constant hard-coded inflation rate (currently ~3.6%) which may dampen its value short-term if miners turn off rigs coming up to the mining rewards halving in May. In the case of gold, if mining becomes unprofitable the new gold supply slows until its price becomes profitable to do so again.

## What is a systemic threat?

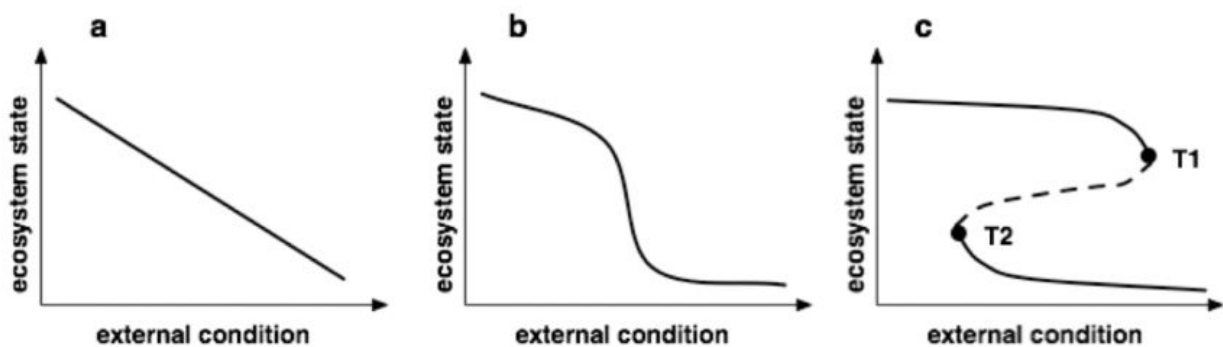
When considering a safe-haven it is important to consider what we are protecting against - probable known risks within a system or low-probability high-consequence systemic risks?

<sup>7</sup> [https://whatisresilience.org/wp-content/uploads/2016/04/Applying\\_resilience\\_thinking.pdf](https://whatisresilience.org/wp-content/uploads/2016/04/Applying_resilience_thinking.pdf)



According to the International Risk Governance Center<sup>8</sup> a systemic threat arises when “systems [...]are highly interconnected and intertwined with one another,” and disruption in one area triggers cascading damage to other dependent nodes. A system is less resilient to these systemic threats the more closely interconnected it is with other external systems.

Renn<sup>9</sup> (2016) describes how such interconnectivity facilitates stochastic, non-linear, and spatially interspersed causal structures that, if triggered, contribute to a ‘domino effect’ that can permanently alter a broader infrastructural, environmental, or social system.



*Different types of ecosystem responses to tipping points due to external changes* **Source:** Scheffer and Carpenter, 2003

Tipping points in the climate shown above display it as a smooth process in chart **a** where the ecosystem responds gradually by itself; while charts **b** and **c** show an abrupt unpredictable change of state known as a regime shift from which it is near impossible to return from. Lemoine and Traeger found that climate policy adjustments remained small even when there is a significant hazard or major losses faced by a regime shift, such as in b and c.

Further, they found that “The lack of knowledge governing tipping point locations in the climate system is severe.” The same ambiguity aversion applies to economic policymakers.

So while it might be straightforward to prepare for known physical threats, preparing for systemic threats requires new strategy and thinking. For an economic fallout similar to a nuclear threat, less probable but with a massive impact, such as a sovereign debt default or pension crisis, we posit that bitcoin would be a more resilient safe haven than gold.

<sup>8</sup> <https://irgc.org/>

<sup>9</sup> [https://www.uni-potsdam.de/fileadmin/projects/wipcad/Media/pdf/Systemic\\_Risks\\_The\\_New\\_Kid\\_on\\_the\\_Block.pdf](https://www.uni-potsdam.de/fileadmin/projects/wipcad/Media/pdf/Systemic_Risks_The_New_Kid_on_the_Block.pdf)

## Risk Versus Resilience Strategies

While risk management and resilience approaches share some of the same concerns, there is a fundamental difference between the two, yet according to the OECD<sup>10</sup> (2019), the two terms are often conflated.

The OECD describes risk as being concerned with what happens before an event – preparing the system for a given threat; resilience, on the other hand, is concerned with how the system behaves after the event occurs and how this is affected by the network effects of other systems. Another difference is risk assessment quantifies the likelihood and consequences of an event to identify critical components of a system vulnerable to a specific threat, and to harden them to avoid losses. In contrast, resilience-based methods adopt a ‘threat agnostic’ viewpoint.

The size of the network also has bearing on the system’s resilience - whereas large systems are more efficient/resilient at absorbing many small shocks, and vice versa for small systems, the larger the system the more prone it is to big one-off shocks, triggering feedback effects within its many interconnected parts. And centralized systems, as opposed to distributed systems, are those with a few large hubs through which many connections pass through making them more prone to big shocks.

The loss of resilience in the financial system can be seen in the declining central bank interest rates since the 1980s as the rate has failed to recover its former strength after each recessionary shock. And while diversity improves the resilience of a system, as it becomes less reliant on its constituent parts, the global economy is premised on a single reserve currency, USD, and US debt to function. This means that breakdowns in the US money markets, such as we saw recently in the repo and Fed Funds markets leads to dislocations in the global economy.

The drying up of the Fed Funds market in 2008 was one of the primary aggravators of the Global Financial Crisis as the Fed Funds market is used not just by US banks for liquidity provisions but by all sorts of global institutions such as insurance, reinsurance and, in turn, these industries have their own dependencies with the banking sector as they insure, underwrite, extend letters of credit and are counterparties to each other in many transactions.<sup>11</sup>

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<sup>10</sup> [https://www.oecd.org/naec/averting-systemic-collapse/SG-NAEC%282019%295\\_Resilience\\_strategies.pdf](https://www.oecd.org/naec/averting-systemic-collapse/SG-NAEC%282019%295_Resilience_strategies.pdf)

<sup>11</sup> Prochazkova, Jana. *Stability of the Financial System: Systemic Dependencies between Bank and Insurance Sectors*. Prague, 2014. Master Thesis, Charles University Prague, Faculty of Social Sciences, Institute of Economic Studies

## The Contagion of Economic Narratives

Just as contagious pathogens attack the cells of their host and even jeopardize the health of a species as a whole, humans are prone to the virality of stories which attack our sense-making and decision-making abilities, leading to unpredictable detrimental effects to society.

Misinformation or ‘fake news’ has been shown to have a higher propagation rate or contagion than real information as it exploits sense-making safeguards. Sensational stories also propagate faster than real information as they have emotional appeal. One example of this during the coronavirus pandemic is the [Tweeted pictures and story of swans](#) reappearing in the canals of Venice after the lockdown when in fact the pictures were taken from elsewhere in Italy and commingled with the fact that Venice’s waterways had actually cleared in colour.

Although the story was not intentionally falsified this informational bias is what psychologists Kahneman and Tversky call ‘narrative framing’, which leads to mental shortcuts in decision-making known as heuristics.<sup>12</sup>

Narratives and constructed stories are a strategy used to influence consumer behavior driven by advertising, PR, sales, propaganda, and politics. The study of contagious narratives is especially pertinent given today’s environment, however, it has been largely absent from economics compared to other social sciences, anthropology, sociology and psychology.<sup>13</sup>

The virality of information is compounded by modern media and social media echo chambers. The effect of people’s perceptions on asset prices is what George Soros described as ‘price reflexivity’ - people’s perception on the direction of an asset is what drives the price in a self-fulfilling prophecy causing bubbles and panics.

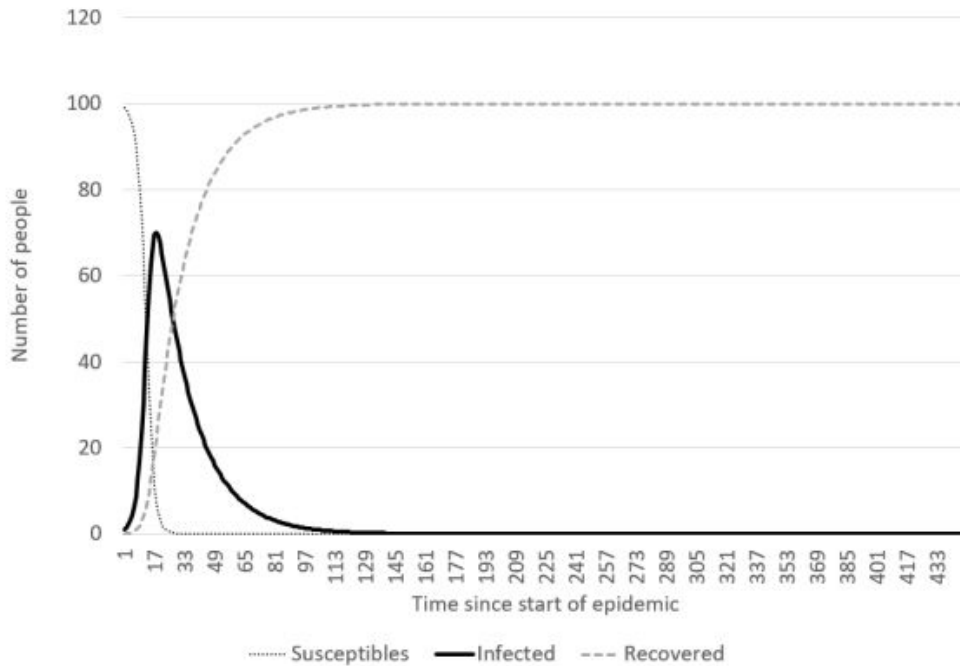
Harvard Professor Robert Shiller has extended this line of thinking to examine the effects of contagious narratives on economic cycles and perpetuating myths, bubbles and depressions. Shiller believes that “The field of economics should be expanded to include the serious quantitative study of changing popular narratives... there has been no controlled experiment to prove the importance of changing narratives in causing economic fluctuations.”

Shiller has brought a quantitative approach to modelling narratives in economics, following the enduring Kermack-McKendrick SIR mathematical model of epidemic disease.

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<sup>12</sup> Tversky, A., and D. Kahneman: *Judgment under Uncertainty: Heuristics and Biases*, Science, 185 (1974), 1124-1131.

<sup>13</sup> <https://cowles.yale.edu/sites/default/files/files/pub/d20/d2069.pdf>



This model implies that after a small number of initial people are infected, the number infected and the contagion itself follows a bell-shaped curve, rising quickly at first, and then falling.

The same logic is applied to narrative contagion:

*Susceptibles (S)* = people who have not had the disease and are vulnerable.

*Infected (I)* = the number of infectives, people who have the disease and are actively spreading.

*Recovered (R)* = the number of people who have had the disease and recovered and are no longer capable of catching the disease again or spreading it.

When variations of the Kermack-McKendrick model are applied to the spread of ideas, we should not assume that ceasing to infect others and forgetting are the same thing. Human behavior might be influenced by an old idea not talked about much but still remembered. This has been called “behavioral residue” (Berger, 2013), an effect which we believe is perpetuating the bitcoin narrative.

Google Ngram book searches for mentions of ‘gold standard’, ‘safe haven’ and ‘coronavirus’ also share the same bell-shaped curve (skewed to the left) similar to the epidemic models.



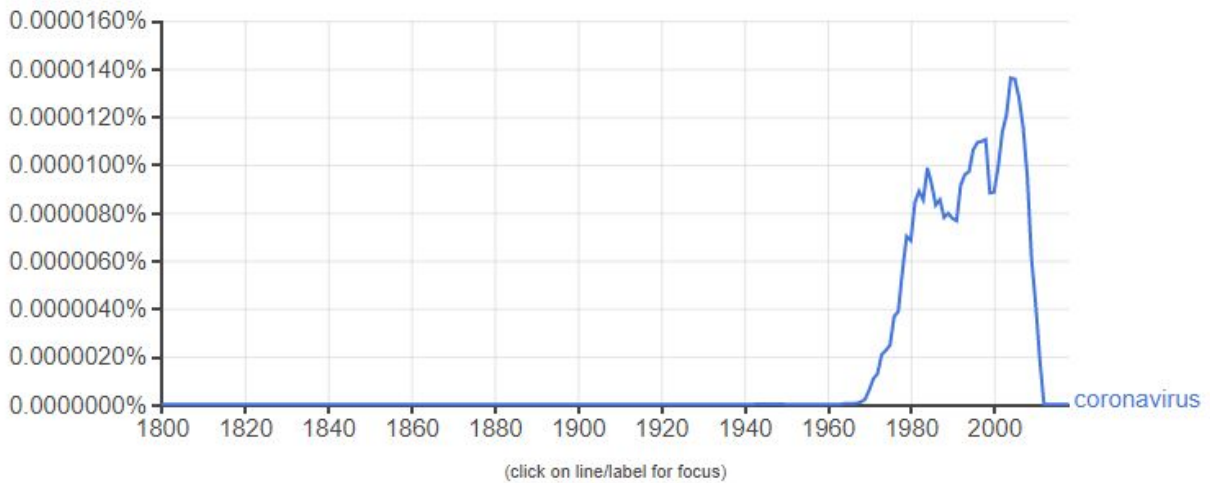
Search in Google Books:

*Gold standard mentions peaked in 1937, around the time Roosevelt removed the hard peg.*



Search in Google Books:

*Mentions of safe havens peaked around 2005, just before the GFC*



Search in Google Books:

*Similarly, mentions of coronavirus peaked in 2005*

We posit that bitcoin is a mutation, or “behavioral residue”, of the safe haven contagion, which is itself a mutation of the gold standard narrative. Since bitcoin there have also been many strand mutations of the cryptocurrency narrative, which have served to justify their existence and price.

## The historical context of narratives in bitcoin

Like any viral narrative, bitcoin has the right mix of ingredients: a hero, the elusive creator “Satoshi Nakamoto”; mystique, around the technology and industry jargon; and emotional appeal, the stories of crypto-made millionaires.

The cryptocurrency industry/community is known for its echo chambers, which idolize and demonize people and projects, particularly on ‘crypto Twitter’ with its white, male millennial and GenZ demographic.

While much analysis has been done on the price relationship between cryptocurrencies and social media sentiment, what we are more interested here is not the causality or veracity of narratives but whether there is, as Shiller calls it, the presence of co-epidemics that could spread the bitcoin ‘safe haven’ narrative.

We find that there is evidence of:

- **Confluence of co-epidemic narratives:** negative interest rates, break-down of the fiat system, safe havens, gold standard, breakdown of capitalism, wealth inequality, digital scarcity
- **Constellation of environmental conditions:** overstretched social and environmental systems, money printing, distrust in institutions/central banks, physical and existential threats

Just as virus strains mutate to remain resistant to cures, mutations in narratives similarly pop up. Bitcoin and cryptocurrency in general is a vivid example of narrative mutations, in order to survive the many booms and busts over the years, spun by the projects marketing, media and PR. Many of the projects have no fundamental logic behind their value other than a narrative and often misinformation about potential future prospects.

To name just a few starting from Bitcoin's cypherpunk origins:

- Digital gold, digital cash
- Be your own bank
- Programmable money
- Utility tokens
- Initial Coin Offerings
- Security Token Offerings
- Initial Exchange Offerings
- Safe haven, store of value

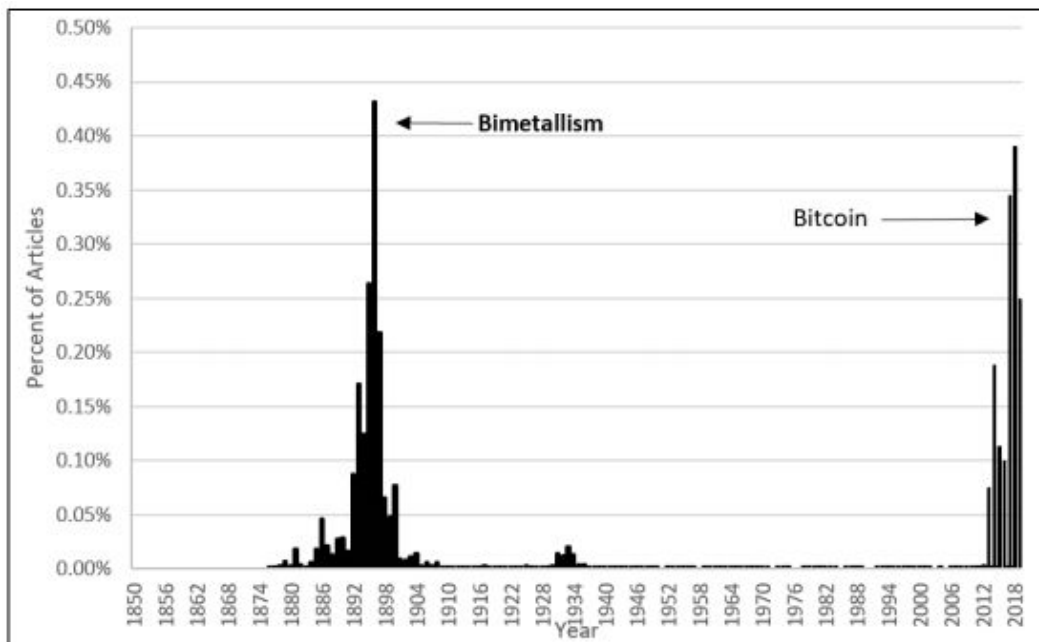
We are of course in the latter 'safe haven' stage which has been debunked by the 50% drop in Bitcoin's price amid what should have been a flight to safe havens.

## The cyclical nature of narratives

Shiller has identified recurrent patterns to economic narratives over the past two centuries. These nine perennial narratives are:

1. Panic versus Confidence
2. Frugality versus Conspicuous Consumption
3. The Gold Standard versus Bimetallism
4. Laborsaving Machines Replace Many Jobs
5. Automation and Artificial Intelligence Replace Almost All Jobs
6. Real Estate Booms and Busts
7. Stock Market Bubbles
8. Boycotts, Profiteers, and Evil Business
9. The Wage-Price Spiral and Evil Labor Union

Shiller also models the virality narratives of Bitcoin and cryptocurrencies over the past ten years. Although Bitcoin may seem like a new unique narrative to its proponents, it is in fact a riff on an old motif of ‘bimetallism’ which arose in the time between two serious economic US depressions (or ‘Panics’) of 1893 and 1907.



*In terms of epidemic models the story of Bitcoin has reached 'virality' levels.*

**Source: Prof Robert Shiller**

The concept of ‘bimetallism’ called for a monetary system based on both gold and silver as opposed to the gold standard which was imposed on and off over many years, recessions and wars. Those pro-bimetallism argued it would make the monetary system more resilient during downturns as under the gold standard, the fixed money supply constrained liquidity and credit supply during recessions which may have exacerbated downturns. Those who supported the bimetallic standard, were generally left-leaning and dubbed ‘Silverites’.

Similarly, ‘Bitcoiners’ have a view that since the US left the gold standard and turned to fiat circa 1970s - there has been too much credit created in the economy which accentuates boom-bust cycles and devalues the face value of money.

The gold vs bimetallism debate reached such a national fever pitch in the US that the 1896 presidential election between William Jennings Bryan and William McKinley was primarily fought on Bimetallism Vs Gold standard. The Democrat Bryan fought for bimetallism to address the problems of inflation and unemployment after the 1893 Depression with a greater quantity of



both gold and silver coins, while the Reuplican McKinley stood for the gold standard and 'sound money' and was largely a representative for East Coast business interests.

The movie *Wizard of Oz*, is widely accepted as an allegory of that presidential race - oz being the shorthand for gold's pricing unit 'ounce'.<sup>14</sup>

## The conclusion of a 20th century narrative epidemic?

The Bryan-McKinley face-off is not unlike the political stances of Bernie Sanders and Donald Trump in the current election. Sanders' economic policies and advisors propose Modern Monetary Theory (MMT) and the Green New Deal both of which are more focused on fiscal policy that would allow for greater money supply to pay for national social security, healthcare and a form of basic income to assuage the problems of the last recession. Trump on the other hand, advocates more of the same since the GFC - quantitative easing to keep credit cheap and interest rates as low as possible.

Shiller models show a similar spike in interest has emerged with search terms for bitcoin since 2012, driven certainly by price speculation but also amid other narratives such as calls for a new autonomous financial and monetary system, financial sovereignty and debt-free money after the 2008 global financial crisis. Just like the period of uncertainty and disillusionment between the depressions of 1893 and 1907 called for a new approach to economics, so too has the interlude between the recessions of 2007/8 and 2020.

While we do not argue that bitcoin is a remedy for any of the systemic problems in the current financial crisis (if anything it has only accentuated boom-bust cycles) and certainly don't propose it as the next reserve currency, we do want to highlight the historical environment, constellation and confluence of narratives that may tip it into contagion.

The power of contagion has been made so evident and prevalent in the case of COVID-19 that it is worth seriously considering safe haven assets that could benefit from contagion in the narrative sense.

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<sup>14</sup> Graeber, David. *Debt: The First 5,000 Years*. Brooklyn, N.Y: Melville House, 2011. Print.

## System Resilience Assessment

In this section we assess both assets on their historical price performance to gauge possible future performance. We then take a holistic view of each system within the wider social, ecological and economic systems in which they exist.

For this we use the resilience matrix, a semi-quantitative method as outlined by Linkov et al<sup>15</sup>. The matrix uses general metrics for measuring relative system resilience to assess the resilience domains of both gold and bitcoin: **1) physical 2) information 3) cognitive and 4) social**. These are collated with the temporal stages of resilience as outlined by the National Academy of Sciences<sup>16</sup>: **1) Prepare 2) Absorb 3) Recover 4) Adapt**.

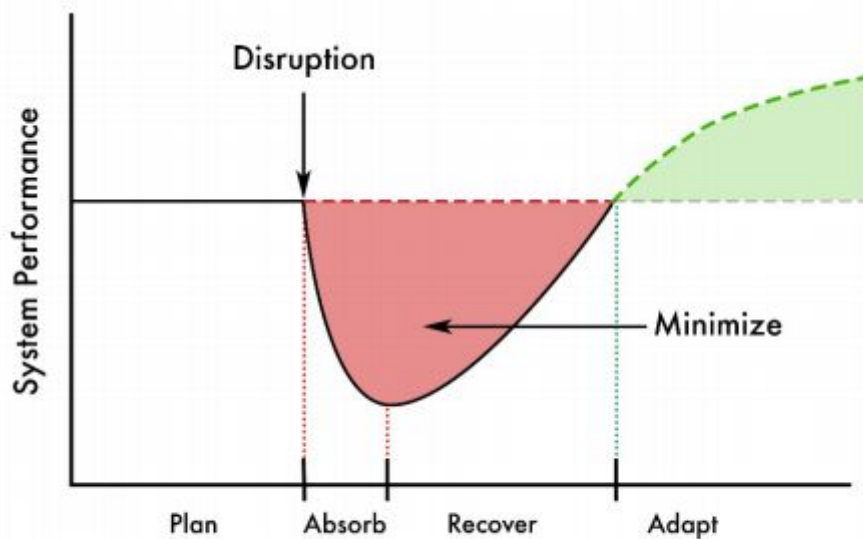


Figure 3. Stages of Resilience as Proposed by US NAS.

Whereas risk management is the approach taken at the plan/prepare stage for known risks, the recover and adapt phases are the focus area of resilience and where choosing a resilience approach can be most effective.

<sup>15</sup> Fox-Lent, Cate & Bates, Matthew & Linkov, Igor. (2015). A matrix approach to community resilience assessment: An illustrative case at Rockaway Peninsula. *Environment Systems and Decisions*. 35. 10.1007/s10669-015-9555-4.

<sup>16</sup> Connelly, Elizabeth & Allen, Craig & Hatfield, Kirk & Palma-Oliveira, José & Woods, David & Linkov, Igor. (2017). Features of resilience. *Environment Systems and Decisions*. 37. 10.1007/s10669-017-9634-9.

It is possible that in trying to augment a system’s resilience and adaptiveness to certain stressors it can become more brittle. The current financial system is such an example that has absorbed many shocks over the generations yet the same repeated strategies of governments, risk-seeking and speculation of investors and money printing of central banks have made it more brittle.

Over the past two centuries, we have had two main strategies in the capital markets; capitalism (premised on the two approaches of the Classical and Keynesian Schools) and communism (premised on the two schools of Socialism and Marxism). The world economy, therefore, has used only two approaches/philosophies to adapt to new market conditions to manage recessions and depressions. Communism has failed on several occasions partly due to it being such a centralized system and capitalism (as we know it) will likely fail due to the growing complexity and appetite for risk needed to sustain it for so long.

Typology of System Resilience by Adaptive Capacities for Absorption and Recovery		
	High Absorption	Low Absorption
High Recovery	Ideal State; high adaptive capacity	Resilient but challenged system; moderate adaptive capacity
Low Recovery	Hard but brittle system; Low adaptive capacity	Significant threat to long-term survival; Low adaptive capacity

Source: OECD, *Resilience Strategies and Approaches to Contain Systemic Threats*

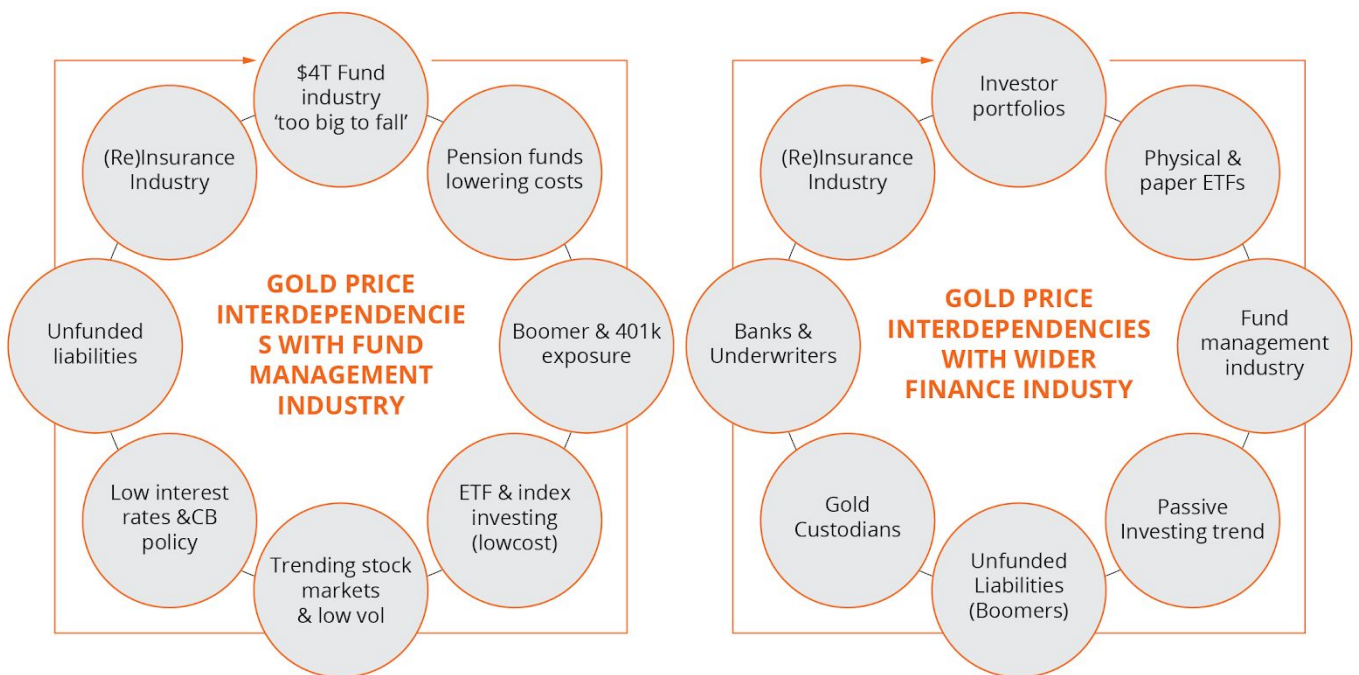
Specifically, while investment markets continually adapt and develop resilience to external shocks, they become increasingly brittle through growing system complexity and appetite for risky investments (options strategies, buying the dip, Martingale strategy, transfer of debt). The traditional risk management/recovery strategies (value-at-risk etc) have been focused on historical data/outcomes, but as mentioned we are at such a stretched and brittle point in all major systems that we should be prepared for low probability, but potentially disastrous consequences.

In this report, we look at the four phases of system performance in gold and bitcoin during this transition phase from this ‘black swan’ disturbance. While we find gold has better planning and absorption characteristics, bitcoin has those traits in the recover and adapt phase better suited to a new regime that has been triggered by this tipping point.

## Gold’s dependencies and systemic risks

Gold is priced at the same risk exposure to passive ‘timebomb’ in the stock market via fund managers as stock prices. Pension funds are also starting to allocate more to ETFs as more tax/stamp duty efficient (“For example, pensions funds wishing to be more specific and deliberate in their asset allocation may seek exposure to certain sectors, certain geographies, certain factors or even ESG, and may look to ETFs as an effective route to market.”)

Often futures make up a substantial proportion of pension funds’ assets under management (AUM), but since Basel III it has become more expensive to **roll futures**. Pension funds, like other entities, have also turned to ETFs and index funds in recent years to reduce costs as they face a **massive potential funding shortfall**. ETFs have tremendous depth and enough for ‘institutions’ to move in and out without pushing the market price, and the spectrum of exchange-traded products is also greater than that offered by almost any other product.



SOURCE: BRAVENEWCOIN.COM

The dislocation in gold ETFs was observed in the sell-off, when a popular ETF of gold miner stocks (GDXJ) closed 18% below the net asset value (NAV) of the underlying index it’s supposed to track. Typically anything above or below a 1% deviation is considered a dislocation.



## Crypto Industry Systemic Risks

Similarly the crypto industry has many internal systemic risks and dependencies that are particularly prone to endogenous shocks. As there is yet little **natural demand** in the crypto market apart from miners and exchanges, the industry is particularly exposed to their balance sheets and caprices. Moreover, both are ‘whales’ in many markets and have a distinct information advantage over many other participants.

As price is the only signal to attract customers (and everybody wants bitcoin not for its utility but its price) it is obvious why it is in everyone’s interest in the industry to keep promoting certain stories and new narratives to keep the industry afloat. We view the crypto industry business model as a massive internal systemic risk which is yet to play out as funding dries up.

The rest of the industry is built upon thousands of largely redundant digital assets trading across hundreds of exchanges and many thousands of startup companies funded by private equity and venture capital funding. Often companies even pay each other for their services in their respective 'currencies'.

Lastly, the retail trader and investor decisions are skewed by all the above information asymmetries and conflicts of interest.

## Resilience Matrix

The basic idea underlying the use of the RM is that in order to create resilience, achievement in all sectors of the system must be identified. This is different from the methodology of solutions in the past, which have maximized singular factors of the system.

To be resilient on any scale, improving the resilience of all aspects of the system is necessary after a disturbance. According to the OECD<sup>17</sup> there are four main domains of resilience for a complex system:

1. physical (sensors, facilities, equipment, storage, system states and capabilities);
2. information (creation, manipulation, and storage of data, price transparency, composability);
3. cognitive (understanding, mental models, preconceptions, biases, and values);
4. social (interaction, collaboration and self-synchronisation, communities, narratives)

Here, we are only evaluating system resilience against specific conditions from the high-impact knock-on effects of the coronavirus pandemic.

Bitcoin resilience matrix				
	Prepare	Absorb	Adapt	Recover
Physical	Low	Low	Medium	High
Information	Low	Medium	High	High
Cognitive	Low	Low	High	High
Social	Low	Medium	High	High

17

[https://www.oecd.org/naec/averting-systemic-collapse/SG-NAEC%282019%295\\_Resilience\\_strategies.pdf](https://www.oecd.org/naec/averting-systemic-collapse/SG-NAEC%282019%295_Resilience_strategies.pdf)



Gold resilience matrix				
	Prepare	Absorb	Adapt	Recover
Physical	Medium	Medium	High	High
Information	High	Medium	Medium	High
Cognitive	High	Medium	Medium	Medium
Social	Low	Medium	Medium	High

We note in comparing the two, bitcoin is less resilient during the *prepare* and *absorb* phases but could be better able to *adapt* and *recover* due to:

1. Resilient to physical contagion from global economy, low connectivity/dependency
2. Resilient to information contagion as a very secure data network protected from hackers and antifragile in the sense that more hack attempts make it stronger
3. Benefit from social contagion through demographics, social media and narratives
4. Benefit from cognitive contagion, a shift in paradigm of digital value and fungibility

It is the product of “information” contagion (the spread of, while also the product of cognitive (through the spread of narratives and shifting paradigms of value due to demographics) and social contagion (it tribalizes communities for better or worse). The narrative of bitcoin has shown a higher contagion rate over its short years than that of gold, which has been around for centuries as a tradition. In ten years it has risen from obscure online chat rooms and communities to sharing headlines in all major financial media as “digital gold”.

As then chairman of the Federal Reserve Ben Bernanke stated at a [Congress grilling](#) on monetary policy in 2011, it’s just “tradition - long-term tradition” that compels the central bank to hold gold as reserves and not diamonds.

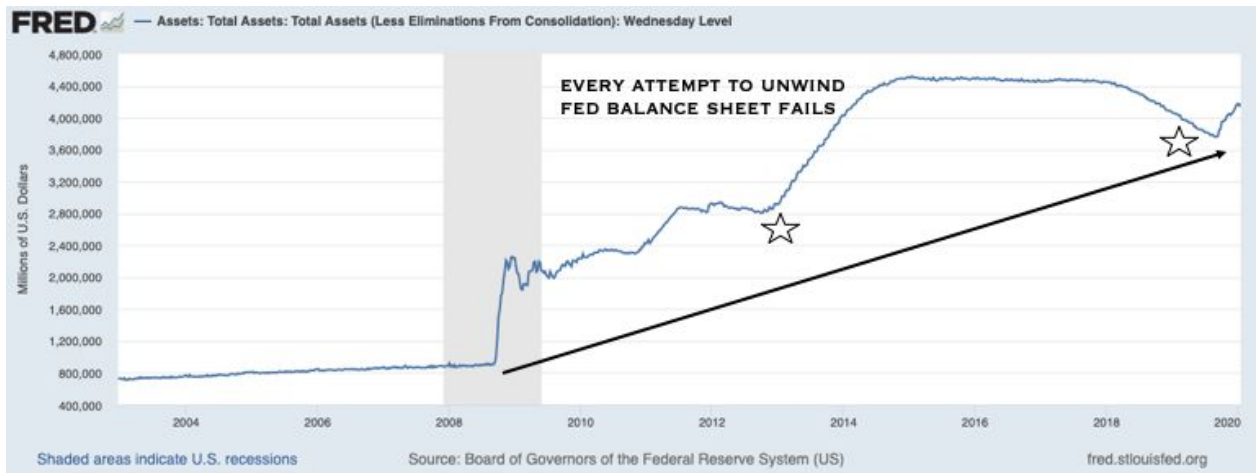




## Current Economic Paradigm at a Tipping Point?

Through this ‘equilibrium paradigm’ we can see how central banks around the world, but in particular the US as global reserve currency, have pursued a path of “stability at all costs.” In other words, we have avoided a forest fire by continuing much the same path after the GFC and added more kindling to the pile, postponing an even bigger event which has now manifested.

Since the depths of the 2008 Financial Crisis, central banks around the world have embarked on the largest monetary experiment in written history. The “tricky part” was how to suck out the massive stimulus pumped into the economy without triggering a recession as a result, e.g. the Fed tightening the balance sheet in 1937. This dichotomy between short and long-term objectives has resulted in the Fed’s balance sheet expanding massively over a ten-year period, and failing each time it attempted to unwind it as market and economic conditions began to falter.

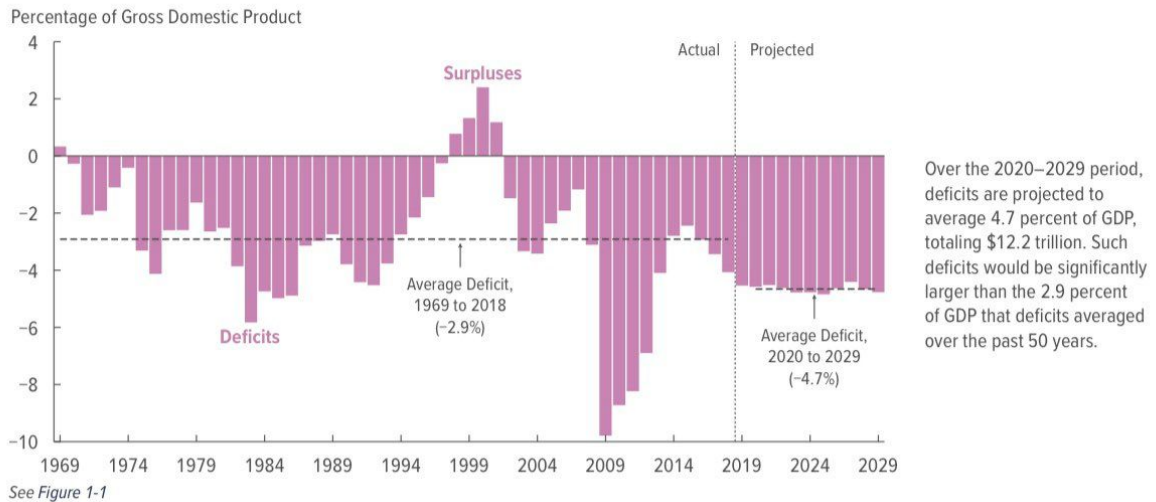


Source: <https://fred.stlouisfed.org/series/WALCL>

The reflation policy has worked, but exacerbated an already precarious situation by making the global macroeconomy even more dependent on the trade and debt imbalances that initiated the crisis in the first place. In essence, central banks decided that the appropriate path to sobriety was to keep drinking. Central banks have now become beholden to their own monetary experiment and the resulting imbalances, which makes the likelihood of them ever voluntarily reversing monetary policy quite low; especially against the backdrop of a ballooning fiscal deficit that will need to be monetized.

**Deficits**

CBO estimates a 2019 deficit of \$960 billion, or 4.5 percent of gross domestic product (GDP). The projected shortfall (adjusted to exclude the effects of shifts in the timing of certain payments) rises to 4.8 percent of GDP in 2029.

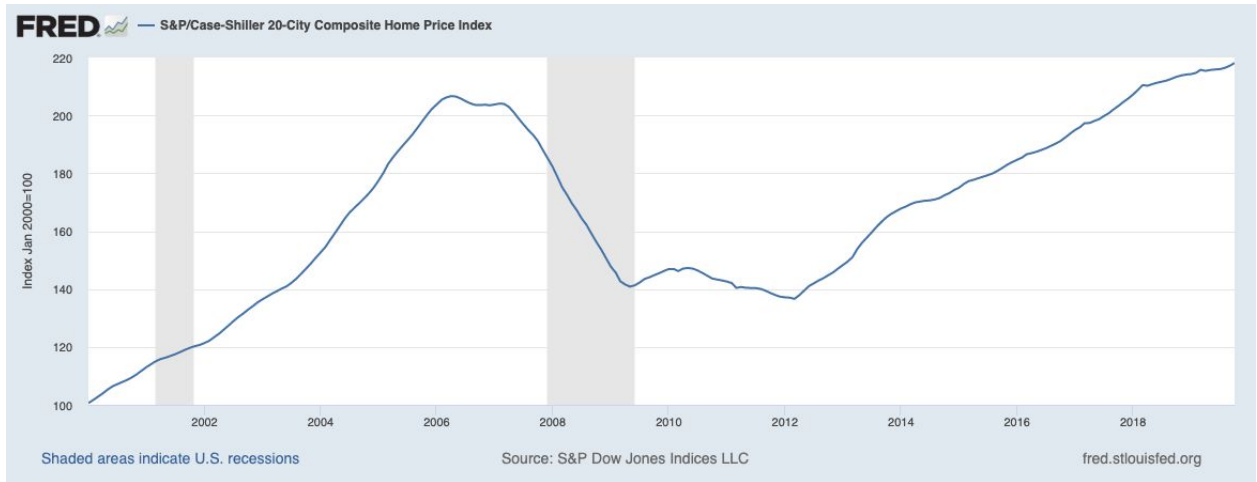


Source: <https://www.cbo.gov/system/files/2019-03/54918-Outlook-3.pdf>  
via Travis Kling, Ikigai Asset Management

**Pre-Coronavirus Economic Cycle**

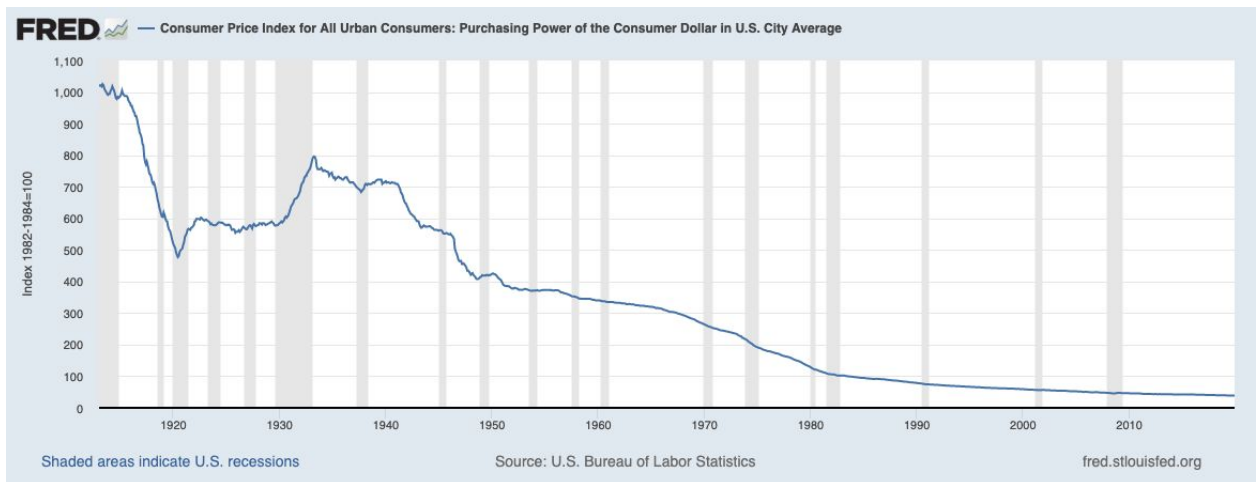
At the end of the day, the monetary experiment accomplished its goal by averting a deflationary depression and re-inflating asset prices, i.e. “beautiful deleveraging” according to Ray Dalio. Unfortunately, over the ten-year period, the US economy has had no recessions, accumulated massive amounts of public debt, and saw several asset classes reach all-time highs, e.g. equity and real estate.





Source: <https://fred.stlouisfed.org/series/SPCS20RSA>

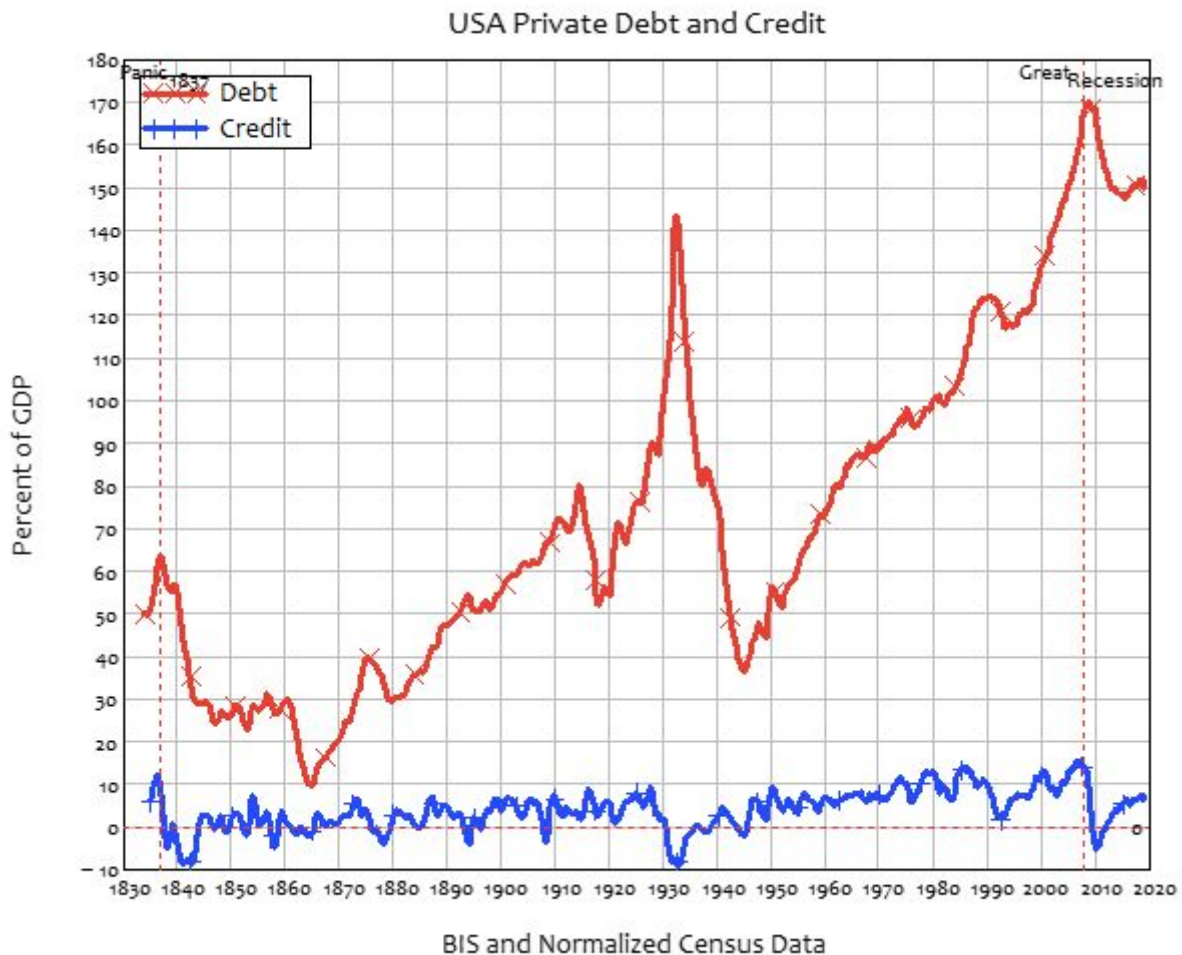
On the surface, no recessions and increasing asset prices seem like good news, but, to paraphrase Ray Dalio, policy-makers are prioritizing first-order consequences rather than second or third by focusing on policies that prop up asset markets to appease short-term interests, at the long-term expense of savers, particularly Millennials and Gen Z. This trade-off in time preferences has manifested itself into a widening wealth gap, a declining purchasing power of the dollar, soaring debt levels, and social discontent.



Source: <https://fred.stlouisfed.org/series/CUUR0000SA0R>

The additional unintended consequences of these policies are dampening macroeconomic volatility, which makes policy-makers complacent because it is a mirage. To quote the economist Steve Keen, the accumulation of private debt enabled by low interest rate policies at central

banks offers the illusion of high GDP growth, low employment, and mild business cycles, i.e. **the Great Moderation**. As was shown in the 2008 Financial Crisis, this illusion eventually crumbles when credit growth turns negative and the economy's **Minsky Moment** arrives.



Source: <https://www.patreon.com/posts/real-vision-how-29426366>

## Post-Coronavirus Economic Cycle

At the time of writing, COVID-19 has become the catalyst that will tip the global economy into a major recession (possibly depression), which will severely damage asset and commodity markets.

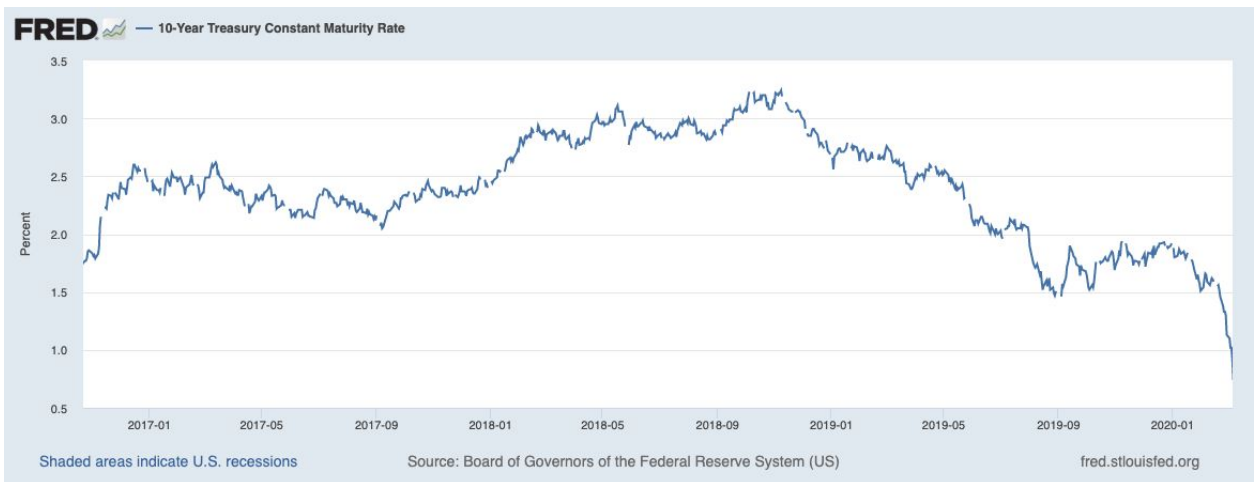
The speed of decline in the equity markets have forced the Federal Reserve to counter with ever increasing liquidity responses. Most recently, the Fed offered an unlimited amount of quantitative easing, i.e. QE infinity, and expanded its asset purchases to include corporate debt. These

unprecedented moves have exploded the Fed balance sheet to all-time highs with little sign of slowing.



Source: <https://fred.stlouisfed.org/series/WALCL>

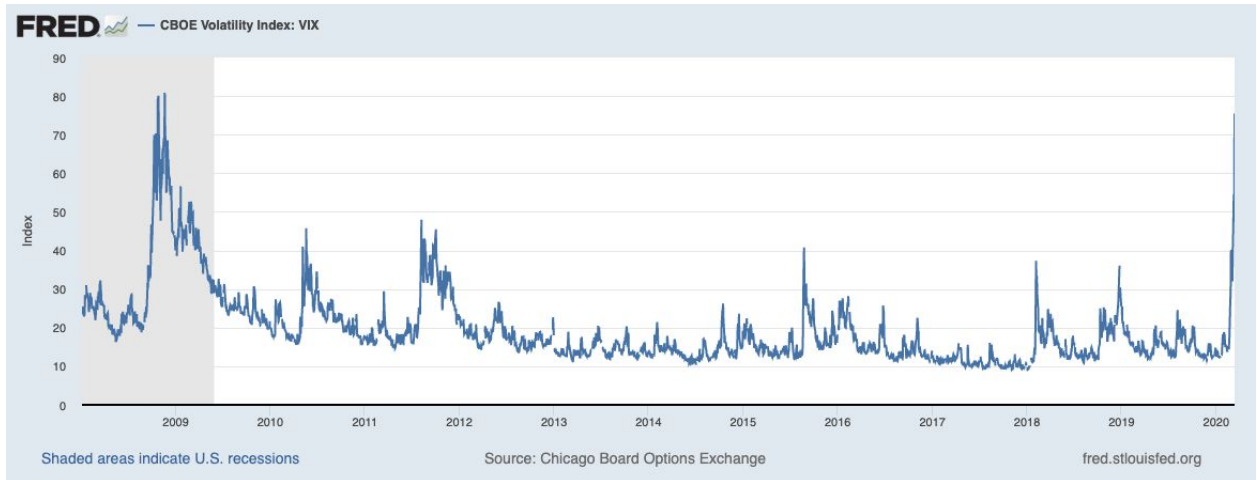
The 10-year US Bond Yields are at historic lows coming off the back of an emergency 50 basis point rate reduction by the Fed, and investors are piling into Bonds and US Dollar as a safe haven. If the trajectory persists, every major economy in the world is headed towards negative interest rates, which is unprecedented.



Source: <https://fred.stlouisfed.org/series/DGS10>

The recent spike in the VIX has been quite remarkable. Currently, VIX has peaked at 84, which matches the top experienced during the GFC. This time around, the panic has been far worse and

faster given the uncertainty of the virus' full ramifications, coupled with massively larger debt loads around the world. Given the aforementioned, the VIX might increase further before finding a top.



Source: <https://fred.stlouisfed.org/series/VIXCLS>

The S&P 500 has not experienced such a dramatic selloff in a two week period since the GFC. Furthermore, given the global economy is far more indebted now than in 2008, central bank policies being far less effective, and an Oil Price War that could spillover into credit markets, the bloodletting could be far from over.



Source: <https://fred.stlouisfed.org/series/SP500>

The principal worry of the global slowdown due to the Coronavirus is if it will negatively affect credit markets or systemically “Too Big to Fail” organizations. The flight to Bonds and Oil Price Wars have seen the High Yield Credit Spreads blowout to proportions not seen since the GFC, i.e. a five sigma event occurred recently.



Source: <https://macro-ops.com/your-monday-dirty-dozen-chart-pack-23/>

Currently, the biggest beneficiaries of the recent “flight to safety” have been US Bonds and US Dollar given the market mode is panic. However, as panic subsides, coupled with the expectation of negative interest rates and new \$1.5 trillion monetary stimulus, alternative stores of value like gold and bitcoin may begin to receive strong bids after the dust settles.

## Store of value assets

### Gold

Since gold's depegging from the US Dollar in 1971, it has produced modest returns for investors, averaging 3.8% per annum, adjusted for inflation<sup>18</sup>. However, its returns have been far better during economic and systemic events. For example, gold has endured six recessions with differing

<sup>18</sup> <https://dqydj.com/inflation-adjusted-gold-return-calculator/>

results depending upon the cause, i.e. stagflation versus disinflation versus deflation, but generally produced superior results compared to other asset classes.

In general, the enemy of store of value assets like gold are falling price levels and high, real interest rates, i.e. deflationary scenarios. The most recent deflation scare came during the 2008 crisis, which saw price (blue line) fall ~25% before recovering later that year after the Fed drastically expanded its balance sheet and the US government committed to fiscal stimulus. The weak fiat policies chosen by policy-makers allowed gold to recover faster and stronger than both the S&P 500 (red line) and NASDAQ (black line).



Source: Yahoo Finance

In fact, in five out of six recent recessions, the price of gold either broke-even or increased within six to 12 months, and took 24 months to break-even only once. In the aggregate, Gold appears to have offered investors a resilient store of value during economic and systemic events over the time period analyzed.





Source: <https://fred.stlouisfed.org/series/GOLDAMGBD228NLBM>

## Recent Performance and the Future

Gold has produced a cumulative return of approximately -17% since 2011, including range trading between \$1200 (support) and \$1400 (resistance) from 2013 to 2019. However, per Raoul Pal, “mounting pressures on the financial system will likely force central banks to extend extreme monetary policies – in order to keep equity prices high and prevent the downgrading of trillions of dollars worth of corporate debt<sup>19</sup>,” gold seems primed to resume its bull trend.

In particular, there are two charts, which are flashing a resumption of the bull trend for gold. First, in mid-2019, price finally broke out of its six year trading range, which allowed gold to finish 2019 +18.4%, its best annual performance since 2010<sup>20</sup>.

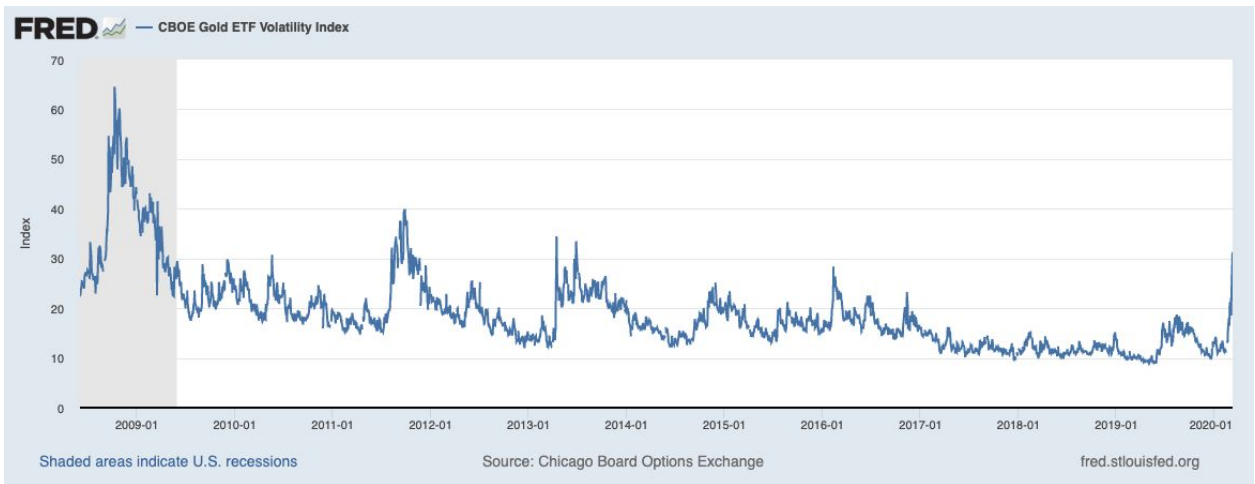
<sup>19</sup> <https://www.linkedin.com/pulse/my-fascinating-conversation-plan-raoul-pal/>

<sup>20</sup> Gold.org



Source: <https://fred.stlouisfed.org/series/GOLDAMGBD228NLBM>

Second, the gold ETF, GLD, volatility was compressing for ten years and sat at ten year lows. Volatility compression in financial assets always leads to increased volatility. Post-Coronavirus, GLD volatility broke out, which could be a prelude to future price appreciation of store of value assets like bitcoin.



Source: <https://fred.stlouisfed.org/series/GVZCLS>

## Bitcoin

The negligence of central banks and governments in lead-up to the financial crisis gave rise to the creation of bitcoin, while the short-sighted monetary policy in the 10 years since gave rise to its exponential growth. In its short history, bitcoin has survived a few speculative booms and busts, and geopolitical and economic events, but still thrived to become the best performing asset of the prior decade. It is worth noting, however, that although it was created during the last financial crisis, bitcoin has never endured a recession in its 10+ year existence.

### Historical returns and correlation

Bitcoin’s historical returns have generated the highest profits for investors in recorded history. The combination of technological innovation and decentralized store of value has enabled its remarkable adoption and growth.

However it has had its share of massive drawdowns over the years, as shown in the table below.

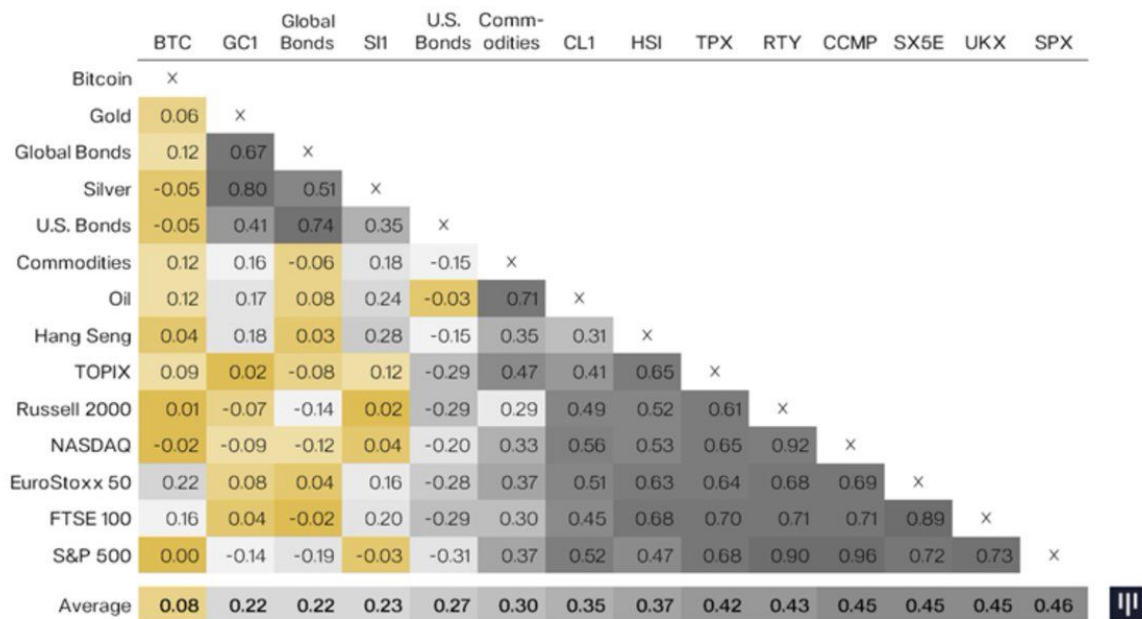
Peak Date	Peak Price	Valley Date	Valley Price	Percent Drop
06/11/2011	\$35	11/21/2011	\$2	93.6%
04/10/2013	\$259	04/12/2013	\$45	82.6%
11/30/2013	\$1,163	01/14/2015	\$152	86.9%
12/17/2017	\$19,666	11/25/2018	\$3,277	83.4%

Source: Brave New Coin

Equally as impressive, bitcoin’s historical correlation to other financial assets has been impeccably low, e.g. average correlation of 0.08 across 13 different assets. Bitcoin’s uncorrelated nature and superior return profile offer investor’s portfolios a better efficient frontier, i.e. higher returns with lower risk.

## Why Investing in Bitcoin: Diversification

Almost No Correlation To Other Asset Classes



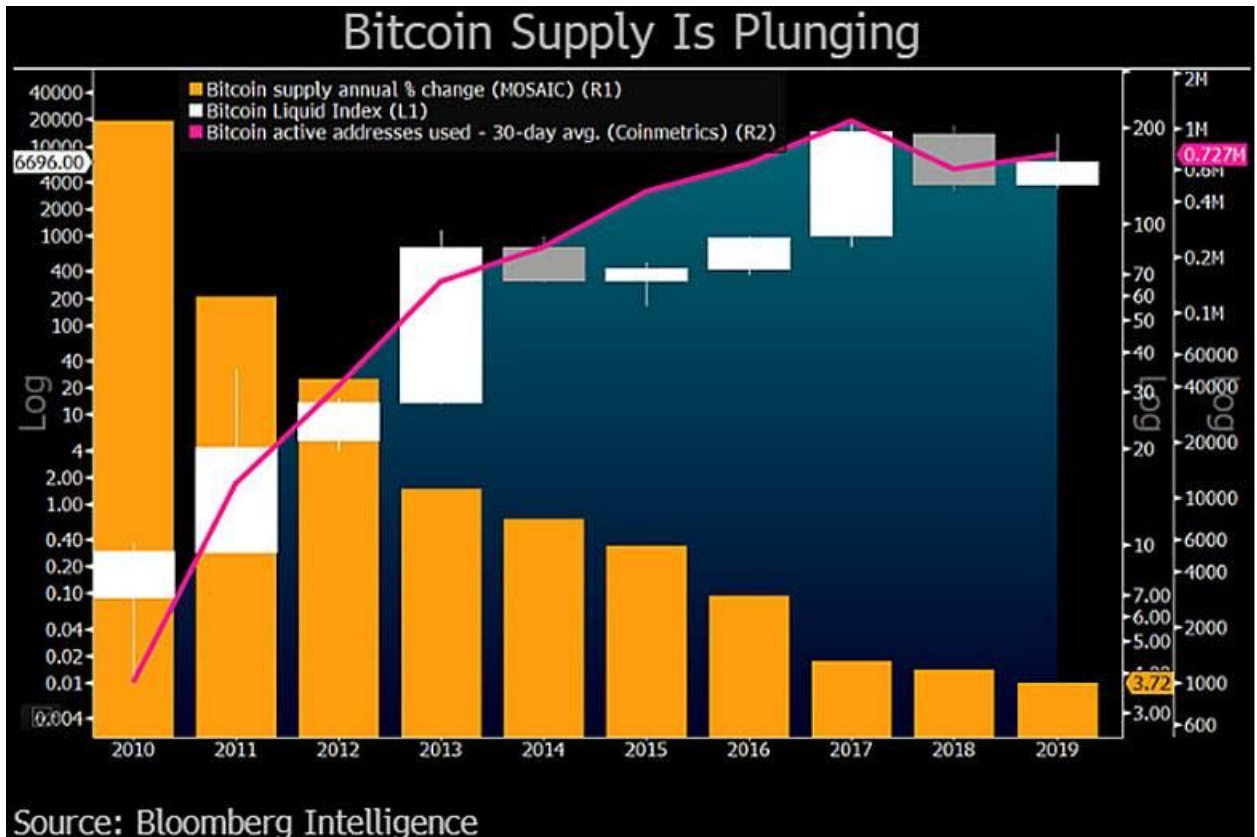
Source: @PanteraCapital

Source: Pantera Capital via PlanB

### Fundamental Growth

The adoption rate of bitcoin has been nothing short of remarkable during its brief existence. Tracking a few key fundamental metrics like outstanding supply and active addresses demonstrates the long-term power of a fixed supply against the backdrop of growing demand (active addresses).





Source: Bloomberg Intelligence courtesy of Mike McGlone

Additionally, per Coin Metrics, in 2019, the bitcoin network processed approximately \$673 Billion in adjusted transaction volume with a mean fee of \$1.24 per transaction. This is impressive, especially when its market cap is compared to legacy incumbents like Visa - with bitcoin and Visa's market caps being \$154 Billion and \$441 Billion, respectively.

Despite its impressive 10-year track record, many questions still linger in regards to bitcoin's store of value narrative, particularly in a recessionary or systemic environment, given it has acted as a speculative asset for most of its existence. In 2019, several geopolitical events unfolded, including Hong Kong's civil unrest, which should have been a boon for bitcoin's SoV narrative, but never materialized. In order to proceed with our resilience analysis, we must properly categorize bitcoin as a store of value, speculative asset, or both.

We look at the recover and adapt phase of the resilience matrix ie. how bitcoin can adapt to a new regime or paradigm shift in the global economy after the dust settles.

# Quantifying Bitcoin as an Emerging Store of Value

## BTC as medium of exchange

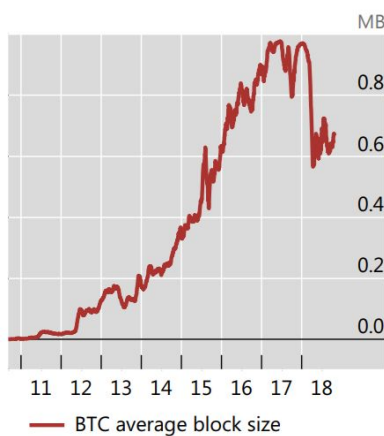
With its slow transaction confirmation times and relatively high fees, Bitcoin’s use as a currency has always been in doubt.

There are also several technical limitations to using BTC as a currency which creates a feedback loop between price, demand, mining expense and transaction fees: Demand for BTC goes up with its price which drives up the cost of mining (and thus transaction fees) and disincentivizes its use as a transactional currency.

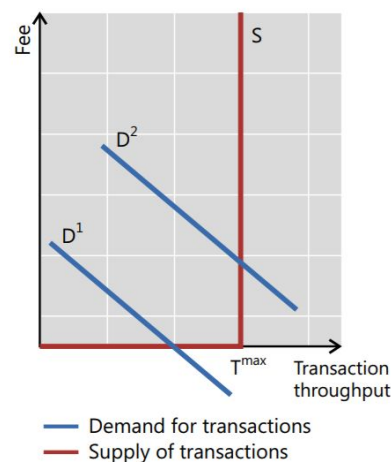
The market for Bitcoin transactions

Graph 7

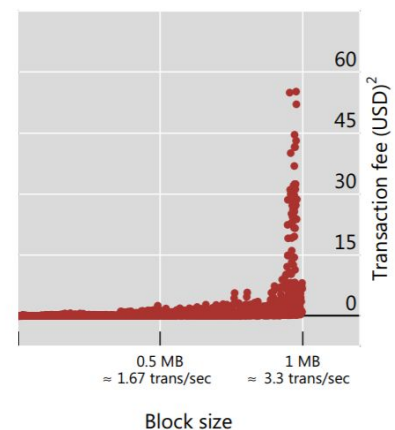
Transaction demand fluctuates widely<sup>1</sup>



With capped supply, demand fluctuations shift fees only when blocks are full...



...which explains the kinked relationship between block size and fees



Miners see all pending transactions and choose those maximizing their fee income, thus generating an average transaction cost. But as long as blocks still have free space, the marginal cost to the miner to include a transaction is 0, and the miners include any transaction with a non-zero fee. Source: [Bank of International Settlements](#)

As the Bank of International Settlements (BIS) summarizes in a report titled *Beyond the Doomsday Economics of Proof-of-Work Cryptocurrencies*, due to limitations in its proof-of-work sybil resistance algorithm Bitcoin’s liquidity is “set to fall dramatically” due to decreasing mining rewards and low retail use if it doesn't migrate to another consensus model such as proof-of-stake.

## BTC as a store of value

### Comparative BTC Days Destroyed

The 'Bitcoin Days Destroyed' (BDD) metric is an imperfect yardstick for the movement of old coins to new owners, and is one of the “Hodl” metrics. It has been updated over the years with iterations such as “Hodl Waves”. However, neither of these metrics disprove other methods or motivations for speculation such as futures, options, OTC and leverage trading.

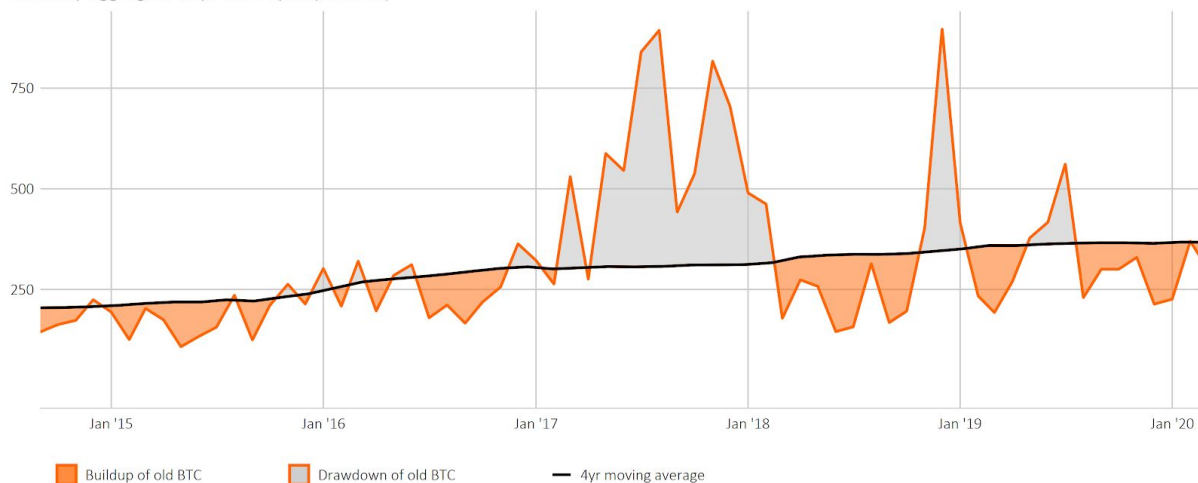
The metric multiplies the value of an incoming transaction to a wallet by the number of days it took for the same sum to leave that wallet. For example, if someone received 100BTC on Monday and spent it on Sunday the bitcoin days destroyed would be:

*Received: 100BTC x 7 days = 700BTC days destroyed*

Although it isn't a pure science it can be used as a rough KPI for network activity and may be viewed as an alternative to transaction volumes as it filters out spam transactions. Large upward spikes in BDD are viewed as long-term holders selling (old) BTC to new speculators and a downturn in price has historically followed. It is inferred as a few large holders (whales) moving their old holdings rather than many small holders moving at the same time.

### Comparative Bitcoin Days Destroyed

monthly aggregate days destroyed (millions)

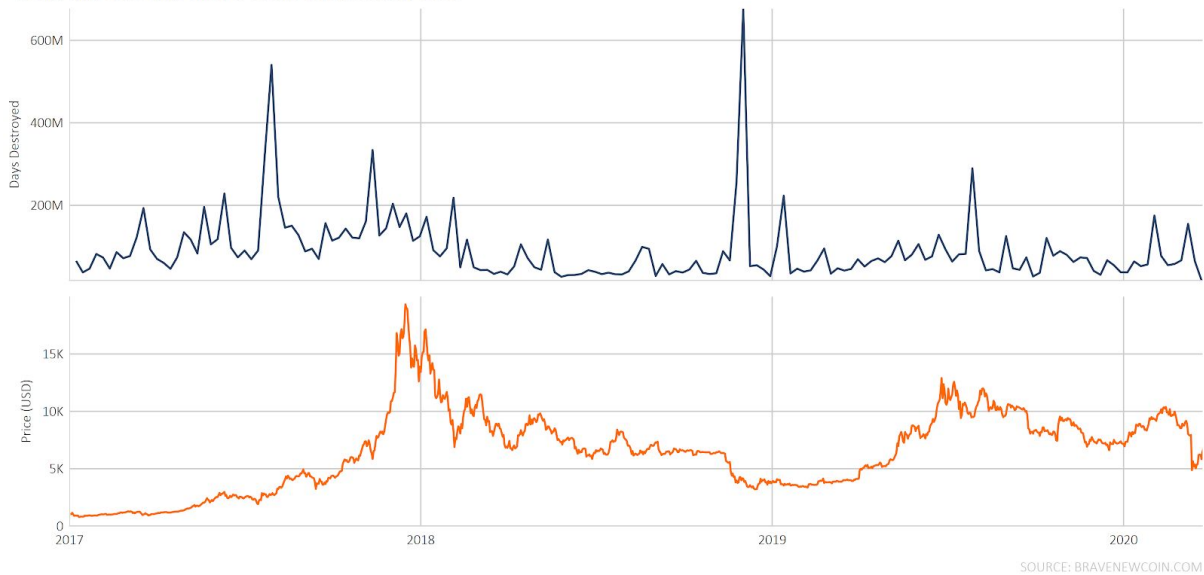


SOURCE: BRAVENEWCOIN.COM

Some of the largest BDD spikes in August 2017 and November 2017, followed the bitcoin cash hard-fork and segregated witness (Segwit) implementation respectively. This may have been due to BTC holders moving their coins from cold storage to hot wallets to implement the changes and also receive their split of newly minted BCH tokens.

**Bitcoin Days Destroyed vs. Price**

weekly aggregate days destroyed and BNC::BLX daily close



*From the chart above, one can see that BDD volatility upwards of 400m days destroyed (bottom panel) preceded large price run-ups or drops. The volatility has been falling since the start of 2017. Source: Brave New Coin*

Since the end of the 2017 bull run when BTC was unequivocally being used as a speculative asset, BDD has been in a downtrend of lower lows which could imply a maturing SoV asset. Or alternatively, it could imply more churn among short-term holders which would account for the lower BDD volatility and most likely show up in higher velocity of BTC turnover.

We consider this lower BDD trend in conjunction with a falling velocity of BTC turnover to indicate a nascent trend towards a speculative store of value. This is not to say BTC is not also being used as a vehicle for speculation.





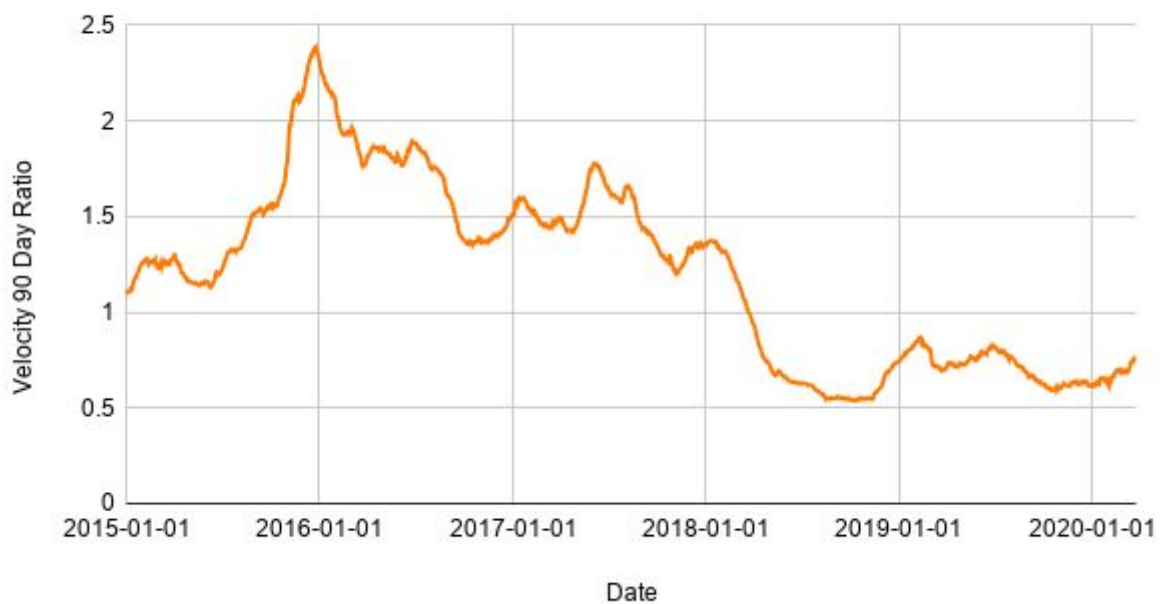
## The declining velocity of bitcoin

The velocity of a currency is a component in Irving Fisher’s quantity theory of money which determines that the price level is affected by its quantity, which in turn affects the value of the currency.

In Fisher’s equation  $PT=MV$ , the Price level (P) of money to buy goods (T), or real GDP of an economy, is the demand side of the equation, which equals the supply side, the quantity of legal tender (M) times its velocity (V). In other words, all money issued is exchanged between buyers and sellers for produced goods. In this equation, changes to the quantity/supply of money (M) is directly proportional to the price of money (P), so, if the quantity is doubled, its price is doubled and its value is halved ( $1/P$ ).

According to QTM, if the amount of money in an economy doubles, price levels also double, causing inflation and the consumer pays twice as much for the same amount of the good or service. Bitcoin was designed to counter this inflationary aspect of fiat money by having a fixed and falling supply rate M, thus reducing P and increasing its value to purchase goods.

### Velocity of Bitcoin 90-Day Ratio (2015-present)



Source: Brave New Coin

Although premised on static assumptions (velocity must be held constant), Fisher’s classical theory broadly fits a transactional currency (as opposed to a store of value) which is demanded for spending rather than hoarding. We posit that Bitcoin behaves not as a transactional currency

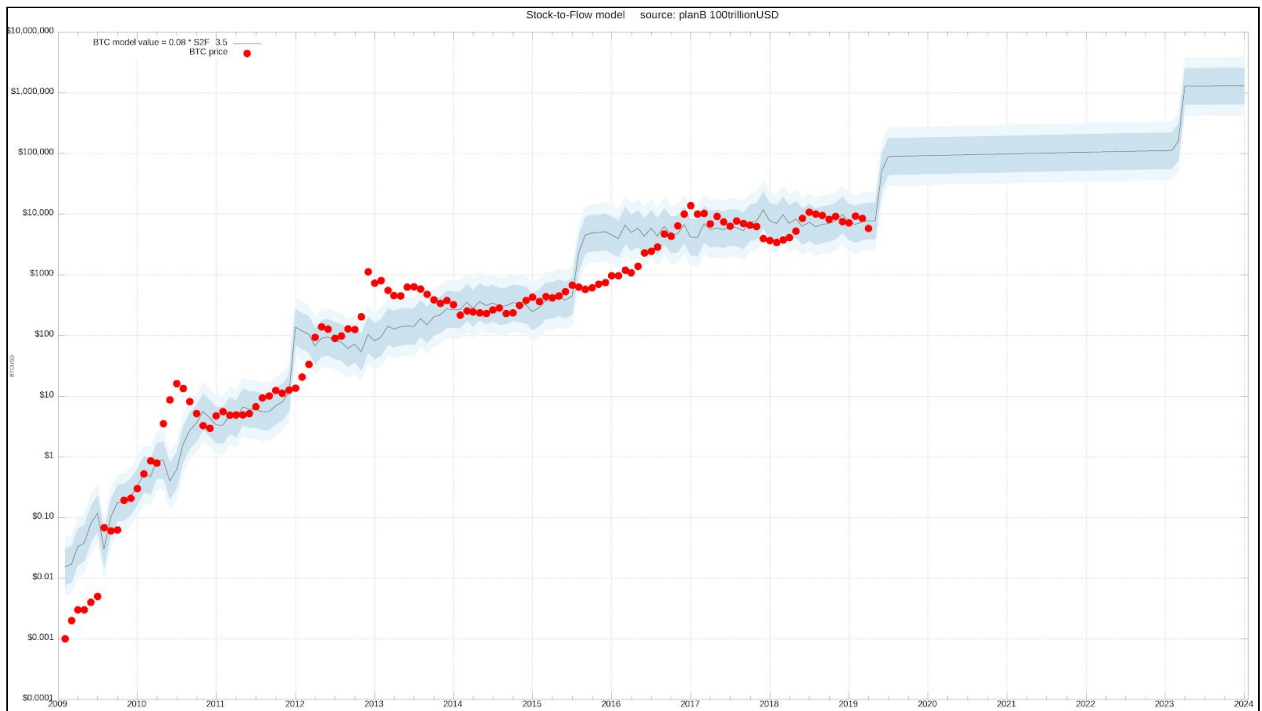
but as a bearer asset that people hold as a store of value as, like gold, there are few market opportunities to exchange it for economic goods (GDP). Also, due to its deflationary design, BTC is difficult to maintain as a unit of account (there is a known supply rate and total supply) making it inflexible as a transactional currency to price adjustments according to supply and demand.

In Fisher's equation, theoretically, bitcoin's decreasing supply (M) should increase its value proportionately - velocity and GDP remaining constant. As such there have been attempts to model the scarcity value in the limited supply of 21m BTC in a stock-to-flow model.

## Stock to Flow Ratio

The stock to flow (S2F) ratio is the current supply of bitcoin divided by the number of new coins created. Historically, the S2F ratio has been a metric used to measure scarcity of commodity assets like gold to determine price. In [Valiendero Digital Asset's recent bitcoin research report](#), a statistical technique named Cointegration was used to verify that the S2F ratio has a meaningful impact on the bitcoin price within a 99% confidence band. Thus, the current statistical information implies that bitcoin's store of value premise is growing given a significant portion of its price appears driven by S2F, i.e. scarcity.

If the model is not overfit, the upcoming halving event, i.e. emission rate of new bitcoin per day decreases from 12.5 to 6.25 in May 2020, should produce a demonstrable long-term uptick in price given the S2F ratio will increase.



Source: PlanB, @100TrillionUSD

Based on Brave New Coin's [halving prediction model](#), the current estimated date is mid-May 2020.

Estimated Halving Date based on ETA – Miners Revenue vs Volatility vs Hash Rate  
Scenario 1 – Chart Generated at: 23rd Mar 2020 @ 00:00:00.00 UTC



The chart above estimates the time until the next halving using the Average Daily Block Time. This is the average execution time of all bitcoin blocks mined a day before. We estimate the number of days left for next halving, by multiplying the average daily block time with the number of blocks left to be mined before next halving. And using this measure we calculate the timestamp for next halving.



## Pre-Coronavirus Behavior in 2020

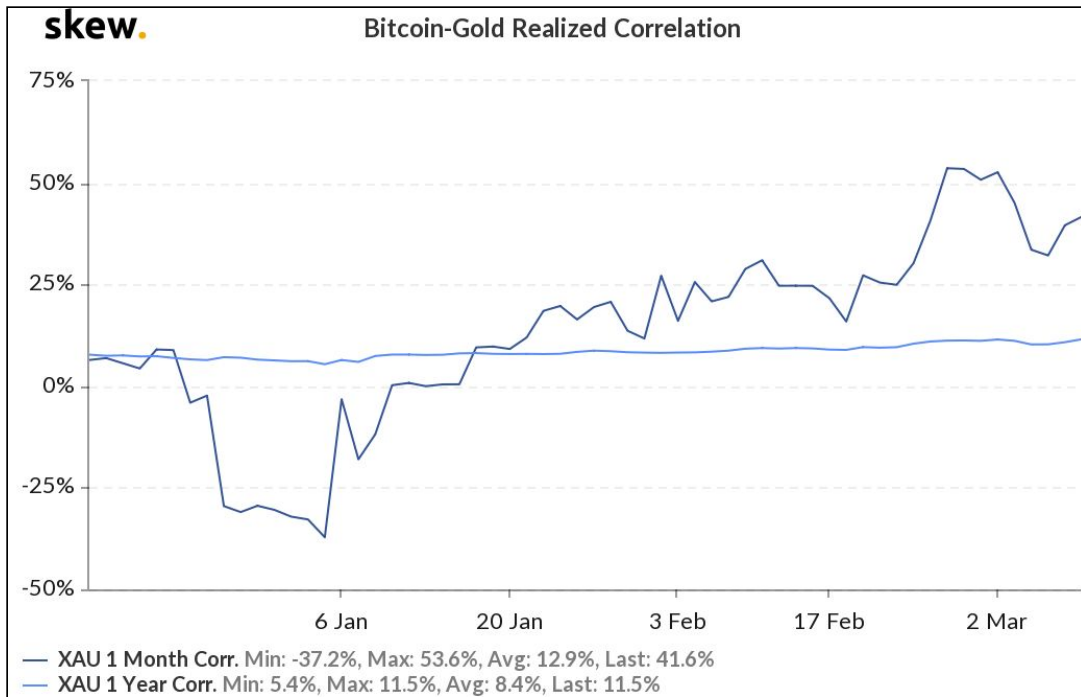
In 2019, bitcoin unequivocally did *not* act like a store of value during various geopolitical crises, which would have lent itself to being such an asset. However, early in 2020, bitcoin showed signs of maturation as a SoV. The most potent example being the price movements during the military escalation between the US and Iran.



Source: Courtesy of [Travis Kling, Ikigai Asset Management](#) via Arca

To quantify, in 2020, per Skew, the rolling correlation between BTC and gold increased demonstrably and peaked at 0.54. Furthermore, the correlation between both assets has been in an uptrend since inception, which strengthens the long-term digital gold narrative, especially as it pertains to stealing market cap from gold.

Then, as the Coronavirus pandemic took hold, store of value assets did not participate in the “flight to safety” given the market mode was panic selling. However, as the market panic subsides, just like in 2008, gold and bitcoin will be primed for positive breakouts.



Source: Skew

## Macroeconomic drivers for stores of value in the coming recession

To quantify the flight to stores of value in the recession brought on by the pandemic we have used the research firm Oxford Economics [Gold Valuation Model](#) to forecast the supply and demand for gold under the following macroeconomic conditions:

- US equities drop 30% in 2020 and within a year the US economy falls into recession, prompting aggressive policy easing by the Federal Reserve
- The US tips into recession against a backdrop of weakening corporate profits. Real GDP averages just 0.2% in 2020 and 0.6% in 2021 before recovering
- This impacts household and business confidence with ensuing asset price falls and a rise in corporate-to-Treasury spreads
- Credit spreads between investment-grade AAA and BAA corporate bonds blows out >200 basis points in 2020 and 2021 and narrowing thereafter
- The Federal Reserve (Fed) eases policy further with the Fed Funds rate falling to 0% by 2021 and remaining close to the zero bound through to 2024
- The global impact is profound, pushing real world GDP growth to just 1.7% (3.7% nominal) in 2020 and 2% (4.9% nominal) in 2021, levels previously seen only during 1982 and the Global Financial Crisis (GFC)
- Trade and financial spill-overs impact economies around the world, with vulnerable Emerging Market countries, such as Turkey and Russia, most severely affected, driven by exchange rate volatility and commodity price weakness. The Emerging Market region sees real GDP growth fall to 3.7% by 2021

Having shown how BTC may be evolving as a store of value asset and shown how this narrative has the potential to become contagious (just as the narrative of gold as a safe haven has been for centuries) we posit that bitcoin demand after the halving in May will follow a similar trajectory to gold during this recession.

While short-to-medium term gold demand will be purely speculative and not due to inherent growing utility as demand for new consumer electronic devices and new jewellery will drop in the recession, in future BTC may be desired for its utility as a secure data network, for software development and fungibility in the digital economy.

## Gold Valuation Drivers

### Economic expansion

Macroeconomic level of GDP growth in advanced and emerging economies, trade growth and national savings. Rising income/GDP is associated with rising demand for gold in jewellery and technology.

#### Factor Inputs

Economic Expansion ⓘ							
		Nominal GDP Growth			Trade Growth	National Savings	
		World	AE	EDA	AE Imports	AE	EM
+	2020-2024	7.0	5.4	10.7	3.1	20.5	30.2
	Long term ⓘ	4.7	3.3	5.7	2.7	9.1	10.0

### Risk and uncertainty

Is assessed by credit spreads in investable vs below investment grade corporate bonds in the US (BAA - AAA), and growth of M1 money supply in the Eurozone and China.

#### Factor inputs

Risk and Uncertainty ⓘ				
		Corporate Credit	Money Supply	
		Credit Spread	Eurozone	China
+	2020-2024	3.56	2.4	7.0
	Long term ⓘ	1.17	3.3	5.9

### Momentum

This is the trends in consumer, investor and producer behavior. Similar to the feedback in stock markets where more momentum begets more in a rising market, growing consumer confidence begets more demand for tech products which begets more producer and mining activity. On the other hand, lower economic confidence would drive the speculative demand for gold and its plethora of derivatives and not necessarily equate to extra mining demand.



Factor inputs:

Momentum <i>i</i>					
		Mine Production Growth	Other Trends, lagged variables		
		4-year trend	Gold price, % YoY	Yield Curve	Credit Spread
<i>+</i>	2020-2024	1.4	169.27	-0.95	3.43
	Long term <i>i</i>	2.0	4.59	0.57	1.17

Opportunity cost

This the income loss forgoing the risk-free rate of interest bearing bonds, as neither gold or bitcoin bears a yield.

Opportunity Cost <i>i</i>			
Nominal Interest Rates			
		US 3m	US 10y
<i>+</i>	2020-2024	1.06	1.87
	Long term <i>i</i>	2.68	3.25

Demand

The resulting demand from all these factors sees “identified” and “implied” investment demand rising in 2020 and peaking around 2021. “Consumption” demand is the inverse situation.



Negative interest rate on \$16tr of sovereign bonds is unprecedented and will be a powerful driver for store of value assets. These estimates are just a rough estimate and don't encompass QE infinity or monetizing government debt (Modern Monetary Theory).



## Bitcoin’s resilience going forward

There are six primary tenets which hint that bitcoin may not only bolster a portfolio’s efficient frontier, but also its antifragility in severe downturns.

### Minimal Correlation and Systemic Contagion

Bitcoin’s average, historical correlation among other assets is 0.08, i.e. extremely low. However, in times of panic, asset correlations tend to converge much higher than their historical norms.

### Portfolio-Level Correlation

Average 12-month correlation of 11 major asset classes with large-cap U.S. stocks

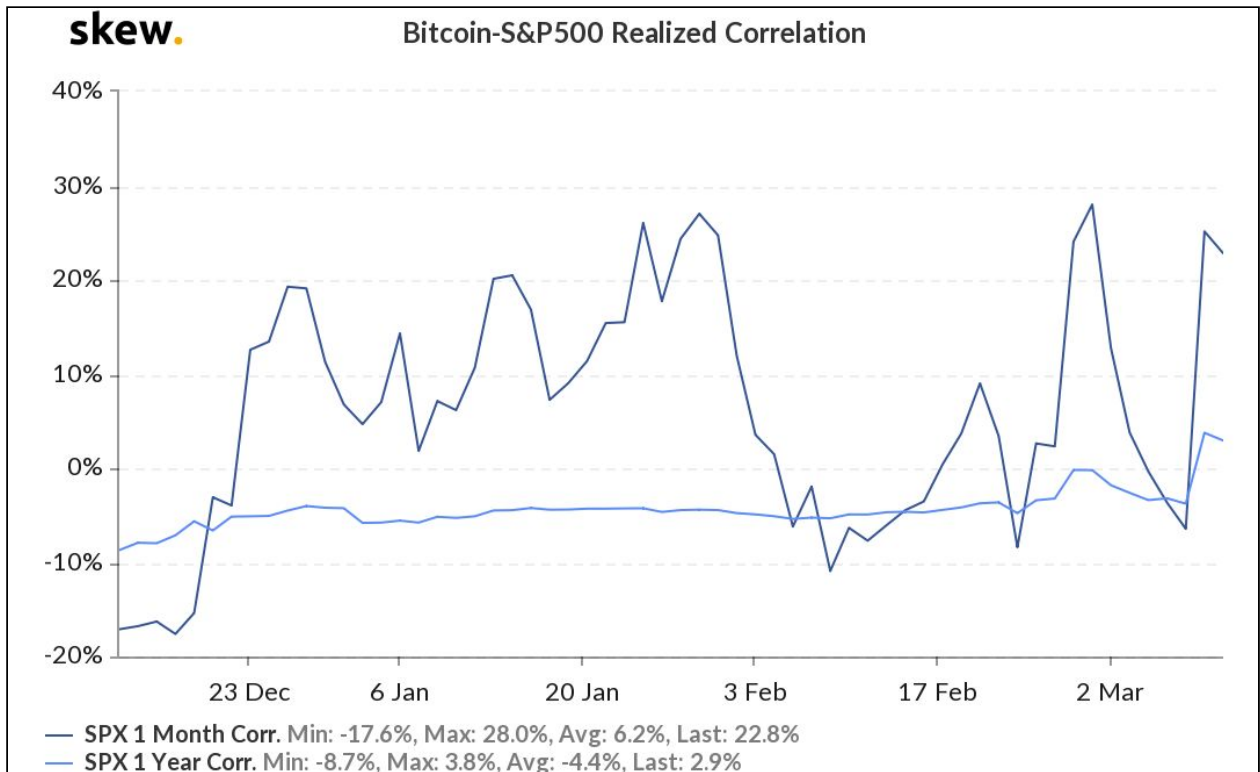


Source:

<https://www.financial-planning.com/news/what-a-study-of-correlations-reveals-about-diversification>

Pre-Coronavirus, we appreciated this fact and generated a probability of contagion i.e. elevated correlation in times of panic by analyzing bitcoin’s historical correlation and gold’s correlation to equities in 2008. We used [Bayes Conditional Probabilities](#) and produced a probability of contagion between ~ 10.94% to 29.16%, which could increase its average correlation to as high as 0.40 during a systemic event.





Source: Skew

At the time of writing, per Skew, the rolling correlation between bitcoin and S&P 500 throughout the recent market panic peaked at 0.27. Thus, still within our prediction band.

- **Risk:** The calculated probabilities might be entirely incorrect, or change over time.
- **Mitigant:** The calculated probabilities are likely incorrect, but within the “ballpark” given the historical data. However, we do expect this probability to evolve over time, which may eventually render our calculations obsolete.

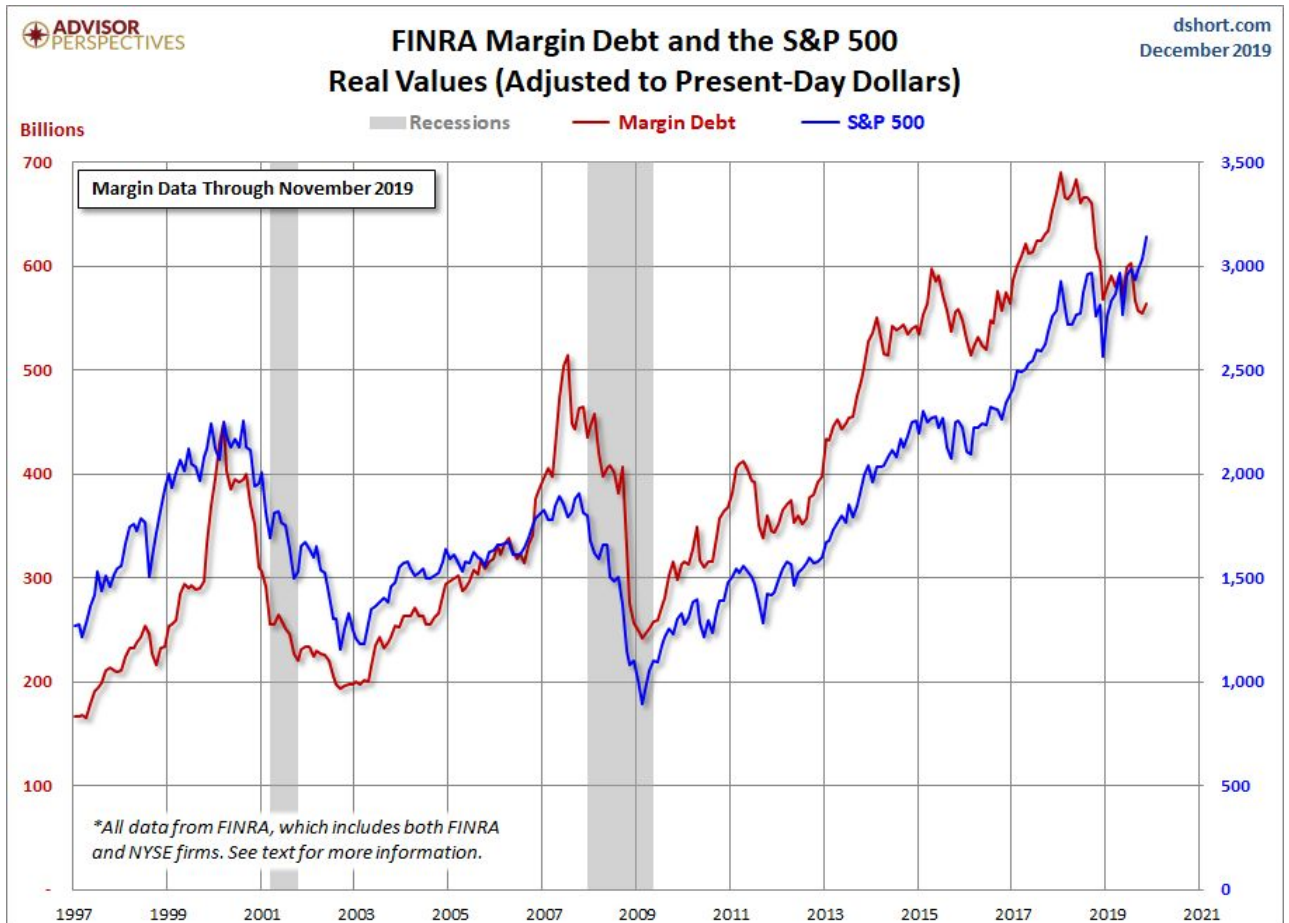
### Outside the Speculative Credit Scheme

Recently, the price of bitcoin has become more influenced by derivatives, i.e. fully collateralized trading leverage, which has enhanced market volatility. However, as shown in the Current Economic Cycle section, economic and financial market booms and busts are highly correlated to the growth in debt (**fractional reserve**) levels. Particularly, when the aforementioned credit growth is over-weighted to speculation versus production.

The crypto industry’s current infrastructure seems to be largely insulated from the speculative credit scheme due to its nascency. Thus, its “unsophistication” and “immaturity” actually increases



its resilience given it is outside the speculative credit cycle of the legacy financial system, thus minimizing hidden systemic risks.



Source:

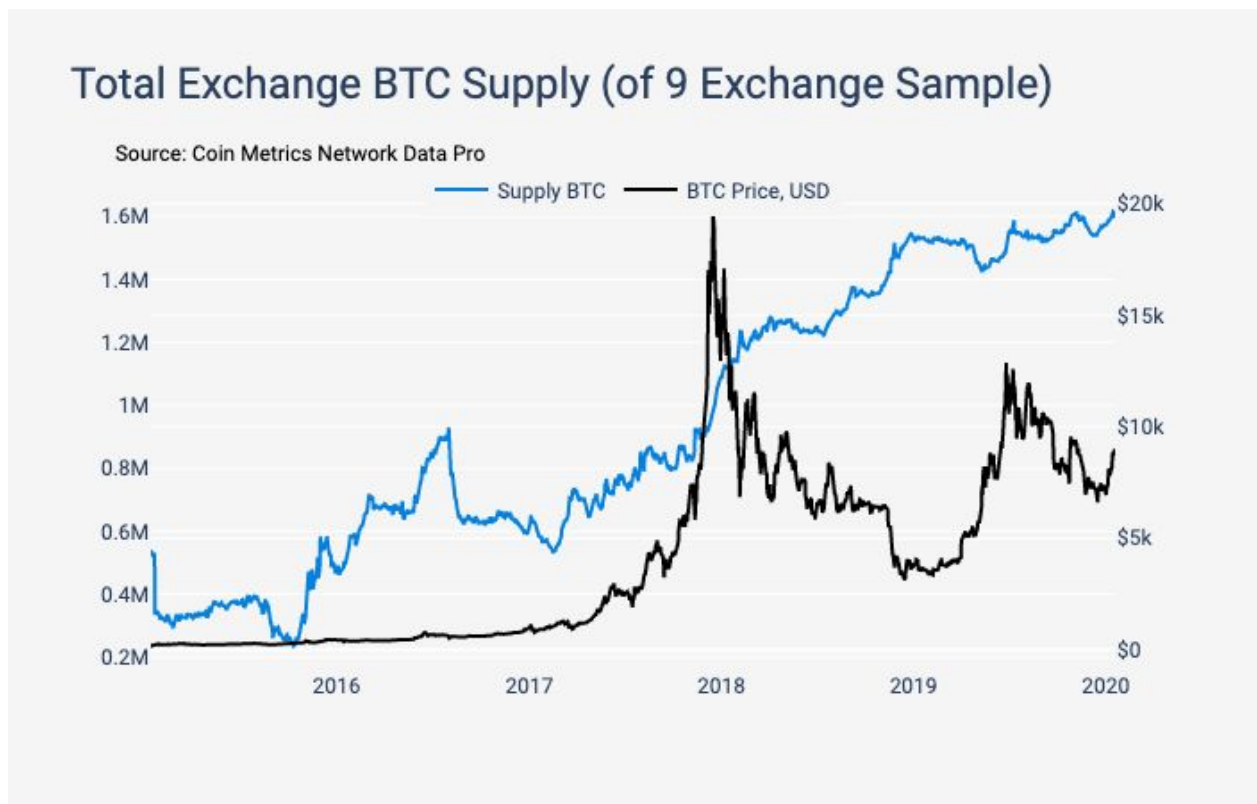
<https://www.advisorperspectives.com/dshort/updates/2019/12/23/margin-debt-and-the-market-up-1-6-in-november>

- **Risk:** The crypto market does contain systemic risks from dominoing liquidations of derivatives contracts on CEXs or smart-contract hacks that would drive extremely negative price outcomes; especially given the sparse liquidity and the unsophistication of retail investors.
- **Mitigant:** The crypto derivatives markets are funded almost entirely by cash deposits, i.e. fully or over-collateralized. For example, user X uses his fiat to purchase bitcoin, which is deposited onto a derivatives exchange in return for leverage to speculate. In the event of a large loss, the position is automatically liquidated, which can cause spot prices to tumble,

but the loss is limited to the initial deposit without further ripple effects into the broader crypto market or wider economy. This would not be the case if the initial purchase was made by a consumer loan or credit card. In summary, crypto derivatives contracts are still risky, but less risky than traditional finance.

## Centralized Exchanges Percentage of Outstanding BTC Supply

To highlight the knowable amount of bitcoin held within or at risk of contagion from the traditional financial system, we use a proxy of Centralized Exchanges (CEXs). The logic being that CEXs that offer fiat on/off ramps are subject to black swan events given their linkages to the traditional finance industry, i.e. fiat bank accounts and working capital lines of credit to finance business operations. In the event of a financial crisis or severe recession, CEXs are at a higher risk of systemic contagion given their banking linkages, which could produce unforeseeable consequences. However, at the time of writing, and per Coin Metrics, the percentage of traceable, outstanding supply of bitcoin that is in control of the top 9 CEXs is only ~ 8.8%. Even if that figure was underestimated by 100%, that would still imply that ~ 82% of the outstanding bitcoin supply is not subject to systemic contagion.



Source: <https://coinmetrics.substack.com/p/coin-metrics-state-of-the-network-41d>

- **Risk:** The percentage of bitcoin supply controlled by CEXs is not fully indicative of the actual amount controlled by institutions that would be at risk of systemic contagion, thus the estimates are incorrect.
- **Mitigant:** The aforementioned figures are definitely incorrect. However, if history is a guide, the percentage of bitcoin supply held by systemically vulnerable CEXs should decrease over time given the ethos' distributed mantra and the small but growing ecosystem of Decentralized Exchanges (DEXs).

## Growth of Decentralized Exchanges

Decentralized Exchanges (DEXs) are non-custodial, peer to peer trading venues that are outside the traditional financial system. Since inception, DEXs have significantly lagged behind their CEX counterparts in terms of trading volume due to a variety of user experience issues. However, **DEX volume and utilization has steadily increased**, which we expect to continue in the future as the user friendliness grows, including cross-chain interoperability.

- **Risk:** DEXs will never come close to replacing CEXs and ultimately fail.
- **Mitigant:** One of the biggest topics in blockchain right now is Decentralized Finance (DeFi), which has attracted money and talent to solve critical problems. We expect these efforts to pay off in the long-term, while realizing that they may never come to fruition.

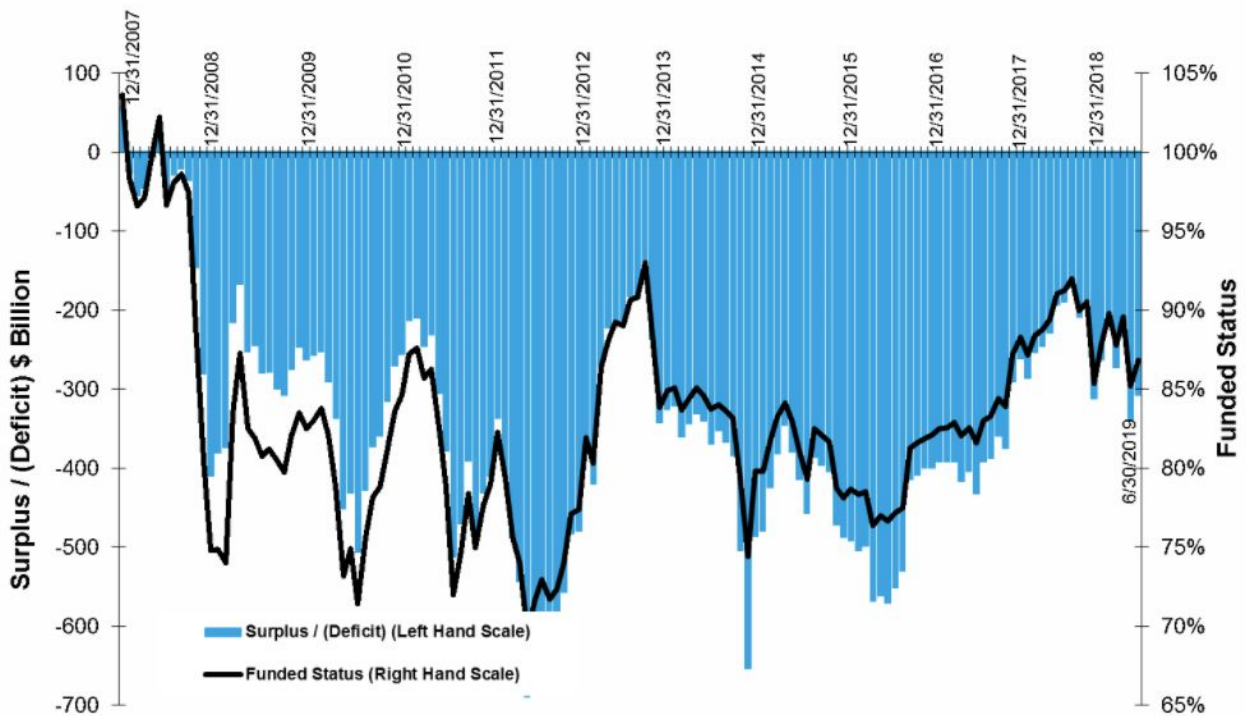
## Pension and Retirement Funding Shortfall

The ticking time bomb of the passive investment bubble and retirement funding gap will likely reach a tipping point as economic activity slows (already occurring) and Baby Boomer selling accelerates. The aforementioned dynamic will decrease equity prices, which will increase sales by retirees to protect their nest eggs, which will drive further declines, and ultimately force central banks to expand their balance sheets to cushion the blow. For example, the chart below plots the labor participation rate against the Fed’s balance sheet, a negative relationship, which can be used as a proxy forecasting model for the Fed’s balance sheet (and dollar strength) as more Baby Boomers reach retirement age.



Source: <https://fred.stlouisfed.org/series/CIVPART#0>

This unfortunate dynamic will produce bad outcomes in the short-term for all assets besides bonds and cash, including bitcoin, but one byproduct is that it could catapult institutional bitcoin investment in the long-term. For example, Pension Funds “chasing yield” piled into passive investment vehicles to close their retirement funding gaps, which enabled the current predicament. However, as equity prices drop, the funding gaps might expand to almost unattainable levels. For example, during the recent market rout, CalPERS, an enormous U.S.-based Pension fund took equity losses equal to a staggering \$69 billion.<sup>21</sup>



\* Source:

<https://www.mercer.com/newsroom/2019-june-pension-funded-status-increased-by-two-percent-in-june.html>

The long-term implications of such extreme funding shortfalls could catalyze Pension and Retirement Funds to allocate significant portions of their portfolios to bitcoin in an effort to, again, desperately “chase yield” to close their gaps given bitcoin’s attractive expected future returns.

<sup>21</sup> <https://www.sacbee.com/news/politics-government/the-state-worker/article241391841.html>



- **Risk:** The systemic collapse of the passive investment scheme and retirement funding gap, simultaneously, may never occur, or be far milder than anticipated.
- **Mitigants:** The macroeconomy is a complex system, thus impossible to forecast accurately. However, the current macroeconomic data implies that the more likely outcome scenario leans towards the negative rather than the positive.

## Summary

From the outset, our analysis was not disillusioned. We knew that a severe dislocation in the global macroeconomy like COVID-19 would produce a very bad price outcome for bitcoin in the short-term. The GFC created bitcoin and the data firmly suggests that central bank's response to the COVID-19 crisis will ultimately benefit bitcoin in the long-term as it did gold, post-GFC.

Additionally, one consequence of central bank's and government's continued fiat-debasing actions might be their populations demanding a return to fully or partially pegged currencies, e.g. a basket of bitcoin and gold a la "The Bitcoin Standard."

This hypothetical scenario falls in line with existing central bank's actions, i.e. gold holdings by central banks since 2010 have increased **demonstrably**. Presumably central banks know that their citizens will inevitably demand a hard currency that ends unfettered fiat debasement and subsidization of the wealthy, thus have already begun to accumulate vast sums.

The power of the aforementioned movement will be driven by developed nations like the U.S. and Europe given populations on the financial periphery, e.g. Argentina, Venezuela, have already begun "crossing the chasm" as bitcoin adopters given its store of value versus local currencies.

Lastly, our analysis roots out two underappreciated points regarding bitcoin's long-term antifragility, which we believe the market is currently mispricing.

First, the cascade effects hiding in plain sight regarding retirement unfunded liabilities, seemingly innocuous \$4.1 trillion ETF industry, and Coronavirus, are a guillotine hanging over the market's head with unknown consequences. For example, Bear Stearns collapsed in 2007, but the GFC did not bottom until almost two years later. Furthermore, the volatility spikes during this brief bear market in equities have been more violent than other cycles at this stage, which might be linked to the passive investment industry simultaneously dumping assets to rebalance their indices. If correct, the downside volatility could be far worse compared to the GFC if economic conditions worsen, which seem likely at the time of writing.

If the aforementioned occurs, and after the dust settles, Pension funds will be staring down the barrel of even larger unfunded liability gaps. Given that, they will likely pursue the same behavior that enabled the equity bubble, i.e. yield chasing. However, this time around the beneficiary is likely to be bitcoin given its attractive future expected returns compared to traditional assets.

Second, bitcoin's long-term antifragility is greatly underestimated despite the potential tailwind from retirement funds. In a very short period of time, bitcoin has managed to produce strong fundamentals. The impressive adoption rates are without a doubt attributed to its narrative contagion factor as an immutable, fixed supply asset. As the panic subsides and bitcoin's resilience grows from weathering the volatility without any government assistance, its store of value narrative is likely to accelerate demonstrably given its viral reflexivity.

Similar to the GFC, which gave rise to bitcoin, the interplay of data discussed in this report seems likely to create a hockey stick effect for bitcoin as the long-term ramifications of the current reflation policies play out over time.

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Andrew is Research Director at BNC Research, a research and consulting company that prepares businesses for the fast unfolding digital economy. He also leads the economic analysis working group with the Washington-based [Government Blockchain Association](#) which brings together the public and private sector around emerging technology.

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