

**Louvain School of Management**

# **A Game Changing Technological Innovation Within Monetary Standards.**

## **The Risks and Opportunities of the Bitcoin Standard.**

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## Introduction

### Topic Choice

A Master's thesis represents the culmination of years of study, coupling intellectual curiosity and the consolidation of academic achievements. Therefore, writing on a personally chosen topic seemed like an obvious choice.

Our modern economic world has suffered greatly through these past years. The economic instability rising in multiple countries (now suffering from currency crisis) since the 2008 crisis, along with the systemic risks within our current monetary system has greatly benefited the emergence and adoption of the crypto-currency called "Bitcoin", a thirteen-year-old decentralized technological innovation.

Although the word "Bitcoin" was first heard in August 2008, when the domain Bitcoin.org was registered (Bernard, 2017), and later in January 2009 when the first block of the Bitcoin Blockchain (the Genesis Block) was mined by Satoshi Nakamoto (Wallace, 2011), it is a word many have heard but few truly understand today in 2021.

This technology has grown tremendously in the past thirteen years, expanding its network and seeing worldwide increased adoption. Bitcoin is monetizing in real-time; it has gone through what gold has in thousands of years in only thirteen years to this day, starting at zero and reaching a market capitalization of a \$1 trillion on February 19th, 2021 (Reuters, 2021).

Bitcoin having reached a point where it can no longer be ignored inspired me to deeply analyze its concept and study its risks and opportunities. This thesis' main focus will be the identification of the opportunities and risks following the adoption of this newly engineered crypto-currency as a monetary standard, called the Bitcoin Standard, when compared to our current Fiat<sup>1</sup> Standard.

Many believe that the economic and social disruption this decentralized network could bring, potentially offering us a choice between monetary standards, will reshape our modern economic world.

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<sup>1</sup> A "Fiat" is an absolute decree from an institution or person in command (Alden, 2020) – Fiat money is a common name for government money

## Research question and objectives

Bitcoin is a very young engineered technological innovation. Given the level of in-depth knowledge in both cryptography and economics that is necessary to fully understand Bitcoin, it isn't surprising that many are struggling in understanding this technology. Yet, understanding the opportunity behind this technology has become the mission of many and of this thesis. This thesis will attempt to shed the light upon this new environment Bitcoin has created.

This paper will work on shedding the light upon the innerworkings of this newly engineered system and its misconceptions. Furthermore, it will attempt to answer the question of whether or not Bitcoin is an opportunity given the unresolved issues that find themselves deeply rooted within our current economic system governed by superior authorities, essentially the central banks and our governments. This also requires us to understand where the current problems and systemic risks of our current fiat system are.

The question we ask ourselves coming in, *"Is the Bitcoin standard an opportunity?"*

Let us not forget that what can be viewed as an opportunity for some might be viewed as a threat for others. In this environment, asking ourselves who might benefit from this technological innovation is a question we mustn't ignore either.

Because of the complexity of this environment, our focus will remain on the opportunities and threats the Bitcoin Standard could represent within developed countries and markets such as the US or the EU.

The objective of this paper is not to look at Bitcoin from an investing standpoint but to provide the reader (governments, businesses and even tax payers) with sufficient information to understand the innerworkings of Bitcoin and understand how and why it can be perceived as money. This will in time help us in constructing our opinion on whether or not the Bitcoin Blockchain represents an opportunity when compared to our current system.

## Thesis's scope and structure

Although the subject of this thesis can be tackled in a variety of ways, in the interest of clarity this paper will focus on providing information useful to our understanding of monetary standards. Different perceptions on Bitcoin will be presented, its system analyzed and compared to the Fiat system and Bitcoin's impact on society as a whole will be examined in this thesis.

We are still early in Bitcoin's development and in order for us to understand how this technology can be categorized as a monetary standard, we must first understand what money is along with its function in society.

This thesis will be structured in four parts.

The first part will find its usefulness in explaining the different concepts required for the readers' understanding of money and monetary standards as most readers never experienced other form of money than government money. This section will both retrace the history of money as well as its function from the Gold Standard to our current Fiat Standard.

The second part of this thesis will be the analysis of the Bitcoin Blockchain's innerworkings. This analysis will bring forward Bitcoin's birth and evolution through time allowing the reader to comprehend both systems and appreciate the contrast between them. It will also follow our previous explanatory section of monetary system to examined why Bitcoin can be perceived not only as an asset but also as money, adding a new dimension to this technological innovation.

The following part will be analysis of the global perception society has on Bitcoin, its blockchain and its potential to be a game changer in our economic world.

The fourth and final part of this thesis will be the assessment of the key characteristic of both systems. Additionally, from the analysis of both systems, strategies based on different risk profiles and appetites, can be brought forward. A theoretical subjective proposed allocation will be constructed from a risk management perspective for different structures; governments, companies and tax payers, along with my personal perception on which monetary standard could presents the least amount risks in the years to come.

## Thesis's resources

This thesis will be based on numerous articles, books, podcasts and newsletters having been written or published by experts having worked in this space for many years. All in order to provide in depth relevant and verified information to the reader.

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*Part I. Money, the Gold and Fiat System*

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## Chapter 1 – Money

In order to understand opportunity and risk as set forth in this thesis the reader must understand the monetary system and the banking system beyond what is commonly known today. Without a common framework of these systems as our foundation, these arguments will make little or no sense. So, before we assess the systemic risks in the fiat standard and the bitcoin standard, we need to understand the systems. And for that reason, we need a foundation for our analysis. In order to do so, we will begin by seeking to understand what “*Monetary Standards*” are. Accordingly, we must understand money along with its necessary properties. Which implies understanding money’s function and history.

*“A monetary standard is a set of institutions and rules governing the supply of money in an economy. These rules and institutions collectively constrain the production of money. Through its constraints on money creation, the standard indirectly acts on prices”* Dr. O’Driscoll Jr.

### 1.1. Money’s History & Function

Prior to the usage of money in modern society, people traded with each other for essential goods or services needed for daily survival. Mainly, we would trade seeds, sheep, pigs, chicken or cattle<sup>2</sup>. This system of direct exchange, otherwise defined as “Barter”, heavily relied on the “coincidence of want”. Once society grew large enough and wealthy enough, we became more specialized. As society grew, the bartering system slowly started to demonstrate different flaws or constraints and it became difficult to trade based on these coincidences of wants (The History of Money, 1996).

During the barter era, people worked for the sole purpose of surviving and saved any excess for bartering and sharing with their neighbors and acquire what they could not otherwise produce themselves. In this system, everyone is working with the goal of producing something of value for others (Breedlove, 2020). This is what caused the specialization in certain fields such as carpentry and building.

As specialization progressed, the direct exchange system began to fail and centralized money became necessary. A new system based on “indirect exchange” (i.e., using money) was designed to alleviate the limits to growth from the barter system. The new system needed an

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<sup>2</sup> the word “cattle” comes from the Latin word for “capital” meaning “property”.

intermediary good that would serve as an accepted medium of exchange between parties willing to trade. A good being an accepted medium of exchange by all involved members of a society is one of the key characteristics required for a commodity to be defined as “money”. This medium of exchange, for the sake of maintaining order within society, this commodity, had to be verifiable to avoid any possible counterfeiting as well as being close to imperishable to hold its value over time (Lewis, 2021).

Broadly speaking anybody that chooses to acquire a certain good for the purpose of exchanging it for another is, de facto, making that first good “money”. However, as societies around the world each have different cultures and belief systems, their opinions on what constitutes money can vary.

With this newly created system growing increasingly more powerful, instead of receiving goods through bartering, people started working for one another and would be compensated with the accepted medium of exchange. They would trade in their time and labor for money. Money’s function is essentially to solve trade issues, it is a form of technology that solves the coincidence of wants problem of the barter system (Ammous, 2018).

To assess which commodities would best be suited to serve as a medium of exchange within their own systems and economies, all societies set guidelines and built their monetary standard through the salability across scale, space and time (Lewis, 2021).

A good that is salable across scale will easily be dividable into smaller units, thus making it more convenient for smaller trades, while a good that is salable across space will easily be transported by its holder. For that, the good must be as small and light as possible. Those are the two easiest characteristics to fulfill out of the three mentioned above. Paper money backed by gold was created for precisely that reason. Its goal was to improve gold’s salability across space and scale as gold was difficult to divide and transport for big purchases.

The third criteria, the salability across time, is the most crucial, and difficult, property to fulfill. It refers to a good’s ability to hold its value through time – if it wants to become an accepted medium of exchange. This is a two-factor problem; it must be able to withstand different forms of deterioration such as rot or corrosion, which correlates to physical properties, as well as being able to hold a certain level of scarcity, underpinning a store of value property which is the foundational property of good money. In other words, the production of that good must be

relatively difficult. This is an important factor as any increase in the monetary supply would automatically devalue the monetary units in the process<sup>3</sup> (Lewis, 2021).

This difficulty in producing new monetary units is referred to as the “hardness” of money. The higher the difficulty, the harder the money. Easy money, on the other hand, is one which its supply can be increased exponentially with ease. This ratio is called the “stock to flow” ratio. (“S/F”) It determines the hardness of money by matching its current quantity, its stock, and the potential production of new units<sup>4</sup>, its flow, as such:

$$\text{Hardness of money} = \frac{\text{Current stock of monetary units (STOCK)}}{\text{New production of monetary units (FLOW)}}$$

The higher the value, the longer the commodity holds its value through time, protecting it from inflation. giving it a clear advantage as money or asset that is a trustworthy store of value. Hard money relies on a high ratio value. The fewer new monetary units are produced, the less that form of money is susceptible to devaluation (Ammous, 2018).

Any commodity chosen to fit a monetary role will see its production rise as producers with the ability to produce it will want to capitalize on their opportunity to become richer. To alleviate such temptation in producers, the selected good should, in theory, find itself to be very expensive and/or extremely difficult to produce. If the producers are able to capitalize on this opportunity, in the process of creating new monetary units for their personal benefit, they will have made anyone with the inability to do as such relatively poorer in terms of personal savings.

But the additional production of monetary units also affects prices in the market both for hard assets and scarce assets. When a commodity used as money becomes less valuable through over production, the value of other assets, goods and services, go up. Therefore, the providers of these other goods and services will seek fair payment and increase their prices accordingly. Thus, making it harder for people who haven’t benefited from the extra production to acquire them, being still paid the same notional amount. Basically, the people that have stored their wealth in that form of money saw their purchasing power diminish. This process has a name called the Cantillon effect (Schultz, 2018).

It is important to emphasize the best money is a store of value. It is merely a representation of the stored energy and labor of the people. It therefore became growingly important to protect

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<sup>3</sup> This process creates a general increase in prices and a fall in the purchasing value of monetary units, i.e., Inflation. – “Inflation” refers to increasing the money supply.

<sup>4</sup> Usually referring to the amount produced annually.

the value of any commodity serving as money within an economy. In truth, the extra production of monetary units can be seen as a form theft, stealing the time people valued and traded to acquire a certain amount of that commodity for future purposes. Depreciating the value of that commodity they are holding is robbing them of the time they have sacrificed. Through the understanding of this monetary principle, previous tweets<sup>5</sup> from the President of the ECB, Christine Lagarde, back in October 2019 are alarming. “We should be happier to have a job than to have our savings protected” (Edin, Milo, 2018). Taken to an extreme, a system where workers’ wealth could no longer be stored and protected through time approaches the definition of slavery.

Any overproduced commodity will no longer be the most attractive form of money. When a better form of money comes along it will become widely adopted. Any monetary unit that depreciates to the point where the commodity it loses its salability across time, space and scale will eventually fail.

To sum up, the key characteristics of money are its acceptability, its scarcity, durability, divisibility, portability and uniformity. While some have more importance than others, all of them must be taken into account when trying to define which available commodity may best serve as a form of money within an economy.

While these are necessary characteristics for a commodity to be valued as money, it is important to understand that money is merely a representation, or token, of value. It represents the energy and time of any individual that has sacrificed both in exchange for money designed for future consumption. The amount of money received is the valuation of our personal time spent and sacrificed. It is our stored labor.

## 1.2. Monies Through Time

Throughout history, various commodities have been used as forms of money. To this day, different types of goods are still used as money within various economies. Each commodity representing the best available store of value and chosen medium of exchange. In certain conditions, even commodities such as cigarettes can be perceived as money (i.e., in prison).

As the world evolved, technology evolved with it. Through this evolution, many commodities have had their monetary roles taken away while other better versions of money arose. This transition always happens through technological advancements, or political decisions, that

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<sup>5</sup> Messages sent on the Twitter social platform.

rendered the production of money effortless. When that happens, overproduction will follow as night follows day until a new form of harder money can take root (Lewis, 2021).

For the reader to better understand what money is and what its key characteristics are, the following pages will work on retracing the history of different monies through time; the cowry shells, aggrary beads, metal coins, ray stones and salt. Explaining their adoption and/or demise to help assess the quality of a commodity as money.

### 1.2.1. Cowry shells

Cowries' shells are one of the earliest forms of money that took the form of a physical token. It first served as money within the Chinese economy around 1200BC (Nova, 1996). They were mostly found in the Indian and Pacific Ocean throughout the nations of the Old World<sup>6</sup>. It became a popular form of money in these regions. It served a monetary purpose for centuries, influenced many economies, and found itself being vastly accepted as a medium of exchange in multiple continents; Asia, Oceania, Africa and even some places around Europe.

This primitive money kept its monetary role as a form of payment and wealth until the 20th century. The shells' abilities to be durable, transportable, recognizable and divisible, compared to other commodities of the time, enabled them to be a widely accepted medium of exchange and store of value. Their unique shape also protected them against any form of counterfeiting or forgery while the fact that most were the same size helped determining their value during trades (Van Damme, 2007). Nonetheless, their transportability became an issue in some instances as some payments required multiple baskets of them, each one holding around 12,000 shells.

Furthermore, with the cowries' shells holding so much value, the Maldives turned their collecting and trading into a cottage industry. The value of those shells was highly influenced by the law of supply and demand. In the areas closest to the center of production, hundreds of shells would trade for a cow while only a few was required for the same purchase in areas around Europe. This spread in value was mostly based on the scarcity of this asset in different places around the world.

This scarcity effect impacted international trade. When African countries traded with India, for instance, the Indians were not keen on accepting the number of shells offered by African countries as a form of payment. While they were highly valued in Africa, they were not in India.

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<sup>6</sup> The Old World is a retronym used to refer to Asia, Europe and Africa.

India, being closer to the shells production, were not valuing these shells in the same way Africans or Europeans did.

These flaws with the cowries' shells, eventually caused their demise and they were rapidly replaced by modern coinage. Nonetheless, they continued to play a monetary role in smaller African economies up until the 20th century. The cowry shell is the longest used commodity as money in history (Van Damme, 2007).

### 1.2.2. Aggry Beads

Aggry beads are decorative and colorful glass beads that were used in ancient western Africa as an alternative currency. While their origins are uncertain, they were a means to trade and transfer wealth across generations for many centuries. Africa's glass-making technology was primitive so the beads were hard to produce. This made them reliably scarce and ultimately a good store of value for that culture.

In the 16th century, the European explorers who reached their shores quickly realized that the beads were highly valued by the locals. Glass-making technology was much more advanced in Europe, allowing these explorers to create perfect counterfeits in mass quantities to be later used in trade with the locals (Ammous, 2018).

The oversupply of counterfeit beads, drained Africa's wealth and natural resources through inflation. Ultimately, the beads, being the representation of their stored labor and time, lost almost all their value. This is one of the earliest money counterfeiting operations known in history.

### 1.2.3. Metal Coins

Through the writings of Greek's historian Herodotus, historians were able to traced back the first forged metal coins known to have had an economic value. These metal coins were introduced in the kingdom of Lydia<sup>7</sup> during the reign of king Alyattes between 610BC and 560BC (Herodotus & de Sélincourt 1954).

The Lydian kingdom held a large supply of gold within its realm, and used electrum, an alloy of gold and silver, to forge their coins. They understood the key properties a commodity needed to have to be money and function efficiently. The Lydians ability to produce high quality coins

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<sup>7</sup> The kingdom of Lydia was located in the western regions of Turkey back in the Iron Age.

increased their value in trade. Their minting of coins with scrap metal in a very precise manner gave each unit an even weight and size which promoted trade.

Through time, the Lydians debased their own currency by increasing the amount of silver within the coins and adding copper in them. By adding cheaper materials and producing more of them it led to the rapid devaluation of their currency. An early example of self-inflicted inflation.

These minted coins were seen by other cultures to be a superior form of money and were adopted by the Persians, the Greeks, the Macedonians, the Romans and even the Chinese. By contrast, China's manufacturing process called "cast coinage"<sup>8</sup>, made their currency highly vulnerable to counterfeiting and quickly their coins devalued (van der Crabben, 2011).

#### 1.2.4. Ray Stones

Around 500BC, while metal coinage was gaining popularity in parts of the world, other forms of currencies were still in use, the most famous being the Ray Stones.

In the Pacific Ocean, on the little island of Yap, in the Caroline islands<sup>9</sup>, ray stones were used as monetary units within the island's economy. These huge discs shaped circular stones were carved out of limestone and brought with great effort given the technology of the day from another Island's quarry, Palau, in bamboo boats. This made additional "production" of these stones very difficult (Docevski, 2017). This difficulty made the stones scarce enough for them to be given a monetary role.

These stones were treated as hard money, allowing them to become a good store of value. However, their mass made them difficult to transport across space. As a result, the Yapese "traded" these stones through an oral tradition where everyone knew who owned what. This tradition made transportation and portability irrelevant. It also prevented thievery since everyone knew which stones belong to whom (Docevski, 2017).

As surprising as it may sound, the value attributed to these rocks had nothing to do with their size. That was only a small part of the equation. Their value was tied to the story surrounding them; the number of people that had died transporting them, the length of the trip from Palau to Yap, the time spent carving the stones... In short, the more difficult it was, the more valuable

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<sup>8</sup> Cast coinage refers to a technique where coins are made by pouring the melted metal into a mold

<sup>9</sup> Caroline islands and today part of the Federal States of Micronesia

the stone. The more labor that went into the stone and the sacrifices made in getting it to their island the greater the value.

Centuries later, the stones met a tragic end as money when the Irish-American captain, David O'Keefe was shipwrecked on Yap in 1872 (Dash, 2011). During his stay O'Keefe learned this culture had abundant quantity of coconut oil and offered to buy it using American currency but the Yapese saw no value in their money. Undeterred and having access to superior technology, he eventually returned with a stop in Palau to produce more stones using explosives. Not all of the Yap villagers were keen on receiving his stones as payment for the coconut oil since he produced and transported them so easily. His stones were viewed as worthless amongst some subset of Yapese villagers. However, other villagers accepted his stones in payment for goods which caused conflict among the islanders. Eventually these stones lost their value and were no longer accorded a monetary role (Goldstein & Kestenbaun, 2010).

#### 1.2.5. Salt

Salt has always been part of our world, its production can be traced as far back as 6050BC, and it has had multiple purposes over the years, including a monetary role at various time and places.

- Around 2200BC, the Chinese Emperor, Hsia Yu, instituted the first known tax whose payment was due in salt.
- This idea was later copied in France by Charles de Anjou in order to finance his conquest of the kingdom of Naples. It was later eliminated by the French revolutionaries after Louis XVI's fall.
- The Britain monarchy also instituted a salt tax for many years in order to support itself.
- In Tibet's history, salt coins were produced from pressed salt cakes with the Grand Khan's image to avoid any counterfeiting of the salt coins.
- In the 12th century, merchants in Timbuktu valued salt equally with gold.
- Historically, Roman soldiers were paid with special salt rations known as "Salarium Argentum" which eventually became the word we know and commonly use today; "salary".
- To this day, salt is still used as a currency amongst the nomadic Ethiopians found on the Danakil Plains.

Its salability across time, space and scale allowed it to be a valuable medium of exchange and store of value for many years and its production was legally restricted in some places (The History of Salt, 2001).

Salt's value as a monetary unit dropped precipitously when technology allowed its mass production. The constant evolution of the modern world caused it to lose its monetary value.

### 1.3. Commonalities of These Monetary Units

These are only a few examples of commodities that have served as money in various times and places in history. All of these commodities failed to maintain their monetary role through technological advancements or political choices that inflated the money supply within the economy to the point where these commodities no longer could be trusted as a store of value and ultimately abandoned as a medium of exchange for a better alternative. These commodities were replaced by better and harder versions of money.

Because the purpose of money is to be exchanged for goods and services, its absolute quantity is irrelevant, but its purchasing power is what truly gives it value. The social benefit of any increase in the money supply is outweighed by loss of purchasing power. The unchecked greed of a select few caused monetary inflations of multiple monies through time.

Ultimately, the key takeaway is that scarcity with the ability to divide and transfer is a key necessity for a commodity to be defined as money, (i.e., to solve the bartering problems society faced in the past) (Lewis, 2021)

Naturally, markets learned through experience and seek out the hardest and most enduring forms of money every time. Commodities chosen as money had reliably high stock to flow ratios, making any attempt to increase the money supply costly, time consuming and difficult.

## Chapter 2 – The Gold Standard

### 2.1. The Bimetallic Standard

#### 2.1.1. Metal Currencies

History has shown that if a monetary unit is too easily produced, it is prone to being counterfeited. That's why markets naturally converged towards precious metals. In addition to being hard to produce, they possessed other superior monetary properties such as divisibility, recognizability, portability, and durability. The difficulty in reproducing precious metals gave them a high stock to flow ratio. In addition, this led to their becoming an ideal medium of exchange and store of value. They were far better than other commodities in serving as money (Ammous, 2018). Gold, silver and copper coins were all different forms of currency. In the 1600's, having multiple currencies based on precious metals was common. Gold coins held the greatest scarcity and had the highest value, so they were used for large transactions and settlements. Silver coins, were the most dominant and widespread, so they were used in daily payments and copper coins were used for very small transactions (The Gold Standards Revisited, 2011).

#### 2.1.2. Asset-backed Paper Currency

Since silver and gold were metal tokens, they were harder to transport for large transactions, and eventually led to them being unsuitable for transport across large distances. Since there were no better alternatives, a new and more convenient layer was added on top of the existing system in the form of warehouse receipts.

This new layer led to an innovation we take for granted today. These “warehouse receipts” facilitated trade and solved currency transportation issues, by allowing the metal tokens to remain within trusted third parties, usually bank vaults. When metal currencies became centralized, banks were given the power to issue paper slips representing a share of securely held metals. These new slips of paper, representing claims on gold and silver, introduced a credit dimension to money that remains to this day. Like most paper or fiat currency we use today, these were debt-based instruments that also introduced counterparty risk. Both of these properties are still present in today's currencies (Ammous, 2018).

These paper claims for gold and silver were used in transactions, with the paper currency being redeemable for gold or silver at the banks who issued these paper claims. Once this redemption feature was removed, the hardness of money became an illusion. A bait and switch of sorts.

This asset-backed form of money required the user to trust the banks where their money was stored if they decided to opt-into this system. By allowing banks to store these metal tokens in centralized locations, the system made tampering with the money supply possible and eventually led to fractional reserve banking. This asset backed form of money required the user to trust that banks would not issue more paper slips than the amount of metal tokens held in their vaults. This eventually led to banks violating the note holder's trust and abusing their power by issuing more paper slips than the gold they held.

In earlier periods, people were vigilant and knowledgeable about *sound*<sup>10</sup> and *unsound* money, and banks had to compete with each other so the integrity of the system was intact (Ammous, 2018). But with each passing generation this vigilance waned and people became ignorant and complacent about money.

## 2.2. The Classical Gold Standard

### 2.2.1. The Gold Standard Act

Silver, and copper came before gold and eventually lost their monetary role because they were less valuable and more easily produced. This led to the US moving from a bimetallic monetary standard to a gold standard around 1834. Gold became the dominant and preferred currency precisely because producing new supply was difficult compared to its existing supply, making it the hardest (and soundest) money available.

In 1880, the world entered what is known as the classic gold standard – bringing unprecedented economic growth and free trade in goods, capital and labor with it. Because of its hardness, nearly every country in the world opted for gold itself as its currency. Twenty years later, the Gold Standard Act of 1900 officially established gold as the only metal currency redeemable with paper currency. (Allen 2009)

Being virtually indestructible, gold allowed people to store value across generations, allowing them to develop a longer *time horizon*<sup>11</sup>, and allowed unprecedented capital accumulation. The Gold Standard became the very first “*sound money*” system in the modern era and brought with

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<sup>10</sup> Sound money is one that isn't prone to sudden variation in purchasing power. Unsound is therefore one that is prone to variation.

<sup>11</sup> Time horizon (or preference) refers to the ratio at which we value the present compared to the future. Because we do not live eternally, present consumption is always valued higher than future, leading to time horizon always being positive.

it decades of uninterrupted global growth and prosperity. Neither boom or busts were seen and inflation was non-existent.

Under the Gold Standard, each country assumed the responsibility for minting coins and issuing a currency backed by a specific quantity of gold. During this era, a nation state was unable to manipulate or control the money supply since its citizens could redeem their currency for gold at any time.

## 2.2.2. The Federal Reserve System

### 2.2.2.1. The FED

This system remained in place until 1913, when the Federal Reserve System was created via the Federal Reserve Act. (FED, 2021)

The Federal Reserve System, “FED”, was establish to oversee monetary policies in the US. Its initial mandate was to stabilize gold and currency values and it was set forth in the Act as; “*The Board of Governors of the Federal Reserve System and the Federal Open Market Committee shall maintain long run growth of the monetary and credit aggregates commensurate with the economy's long run potential to increase production, so as to promote effectively the goals of maximum employment, stable prices, and moderate long-term interest rates*” (Federal Reserve Act, Section 2A. Monetary policy objectives, added 1977, amended 1978, 1988, 2000). The Fed’s role was to establish economic stability within a system growing in complexity. The establishment of the Fed made fractional reserve banking possible and it enabled the US government to issue debt to finance war without approval from the electorate.

### 2.2.2.2. Fractional Reserve Banking

Today fractional reserve banking is the foundation to all state-run monetary systems. It originated centuries ago, when banks discovered that all depositors do not redeem their gold or silver at the same time. This created an opportunity for bankers to convert the depositor’s stored coins into interest-bearing assets (i.e., loans) that generate income for themselves (Alden, 2020). This use of the depositor’s money without permission altered the banker’s role from charging fees for safe storage to using other people’s money to earn interest. Through the magic of fractional reserve banking, \$1 of deposits could produce \$9 in loans out of thin air.

Through fractional reserve banking, banks no longer hold the depositor's money like a bailment<sup>12</sup>, ready to return every dollar deposited “upon demand”. Even more shocking, the money people believe sits in their bank account is legally not theirs. Instead, it is being repurposed by the bank for its own benefit. In this system, depositors have IOU's<sup>13</sup> with the banks (Ammous, 2018).

This eventually leads to the modern-day bank runs during which depositors lose faith in their bank, and try redeeming their paper slips for gold or cash. Since the bank does not have sufficient gold or cash on hand to satisfy all its depositors, the bank risks failure and insolvency.

In fairness, these bank failures are best borne by shareholders and lenders, not depositors. However, that is not how modern banking systems work. Today we have banks that are too big to fail. The possibility of mismatching maturities (i.e., fractional reserve banking) left banks vulnerable to liquidity crises and bank runs. Rather than require banks to be fully responsible to their depositors with hard money, central banks were created to be lenders of last resort. As lenders of last resort, central banks provide cash to member banks to prevent bank runs. This increase in the money supply allowed central bankers to support those banks struggling with liquidity.

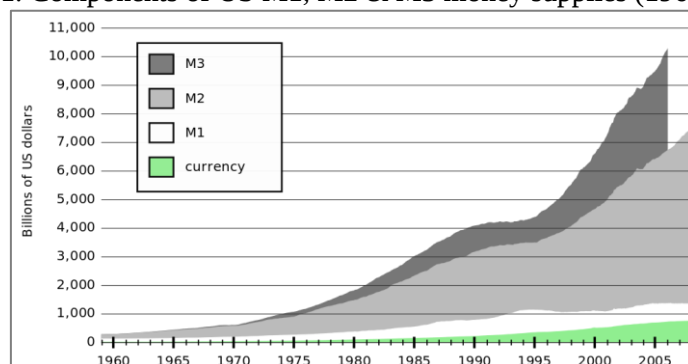
In our legal system, bank deposits are not bailments, the funds deposited in banks are no longer the property of the depositor. Banks repurpose these funds by expanding credit and expanding the money supply with “virtual” currencies. The difference between the actual amount of physical money printed and the total money supply can be visualized through the M money's supply components reported by the US central bank.

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<sup>12</sup> Legal relationship where an owner transfers possessions or properties for a time, retaining ownership.

<sup>13</sup> An IOU (“I owe you”) is an informal acknowledgment of an existing debt.

Table 1. Components of US M1, M2 & M3 money supplies (1960-2006)



Source: Board of Governors of the Federal Reserve System (US) (2021)

The table above allows us to visualize what happened to the money supply in general from 1960 till 2006. The “Currency” is the actual physical money printed, M1 represents currency plus demand deposits while M2 represents M1 as well as time deposits, savings deposits and different money market funds. M3 represents M2 plus large time deposits and other forms of money. (Since 2006, the M3 supply is no longer reported periodically by the Federal Reserve. And as Henry Ford foretold;

*“It is well enough that people of the nation do not understand our banking and monetary system, for if they did, I believe there would be a revolution before tomorrow morning.”*

### 2.2.3. The Executive Order 6102

Just Twenty years after the FED’s creation, in 1933, during the Great Depression<sup>14</sup> the United States government made gold’s ownership illegal for its citizens through “*Executive order 6102*” (see appendix 1) signed by US President Franklin D. Roosevelt. This executive order forced citizens to sell their gold coins and bullion to the state in exchange for a paper currency issued by the central bank at a fixed rate of \$20 per ounce (Ammous, 2018). The phrase “this federal reserve note is redeemable for gold” was removed from this new currency.

Former President Herbert Hoover saw this draconian event as a red flag and warned President D. Roosevelt, “*we have gold because we cannot trust governments*”.

This Executive Order was signed to prevent bank runs on the gold reserves at the Federal Reserve Bank following the market crash of 1929 and so began the erosion of trust in paper money. The Gold Reserve Act prohibited private ownership of gold without a license and

<sup>14</sup> The Great depression was the worst economic crisis in history, following rapid expansion in the Nation’s wealth in previous years, and lasted from 1929 till 1939. It began with a stock market crash that set a panic throughout Wall Street and wiped-out millions of investors.

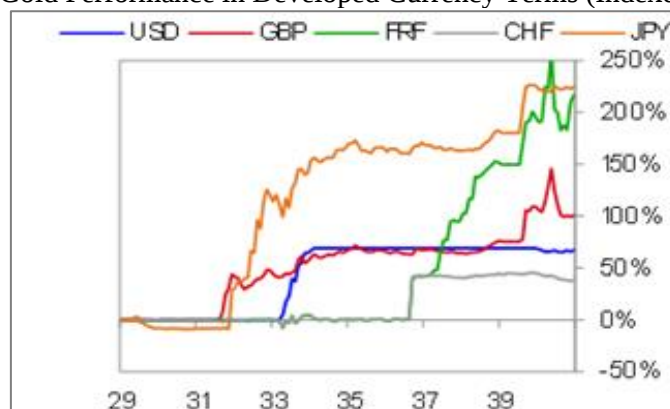
citizens could no longer redeem their dollars for gold. Adding insult to injury the US raised the price of gold to \$35 per ounce after this confiscation order. This marked the end of a true asset backed currency in the United States that allowed its citizens to keep the government honest. From this point forward, all money issued was debt based.

The value of the paper currency issued by the government was purported to remain backed by gold, but without the ability to redeem these notes for gold the Fed and US Treasury could more easily issue debt with impunity. By holding the majority of the gold and “claiming” that the issued paper currencies were backed by gold held in central vaults, the US government was able to convince its citizens the unbacked US dollar was just as valuable and accepted as the asset backed US dollar before 1913 (Alden, 2020).

By confiscating people’s gold and having full control over the gold supply, the US government was able to build up their own gold reserve whilst also serving as a gold custodian for allies<sup>15</sup> who could redeem it whenever required.

With full control over the base layer of the money supply, it didn’t take long for governments to expand the money supply built on top of the gold held in their vaults, causing inflation and the paper currency to lose its value and purchasing power through time. Almost every nation took advantage of this system and sharply devalued their currencies as soon as this new system was in place. This caused frequent resets and sometimes even suspended their gold pegs in later stages of this system.

Table 2. Gold Performance in Developed Currency Terms (Indexed to 1929)



Source: Bridgewater Associates (2021)

15 Following the events of WWI, many countries had shipped their gold to the US as a mean to protect their wealth.

The Gold Reserve Act also authorized FDR<sup>16</sup> to increase the price of gold. Gold's price went from to \$20.67 per ounce to \$35 per ounce, consequently devaluing the dollar (Amadeo & Walters, 2020). The government continued to confiscate gold from private citizens until the late 1960s.

## 2.3. Bretton Woods

### 2.3.1. New Global Trading System

In 1944, the United States summoned its allies to Bretton Woods, New Hampshire (Amadeo & Brock, 2020) in order to discuss a new global trade system following World War II that would place the US dollar at the center of the global monetary system.

Under the Bretton Woods system, the US took possession of the gold held by other countries' central banks. The US dollar was to be backed by gold and the other countries agreed to peg their currency to the US dollar, thereby making it the global reserve currency. Those countries could convert their currency in exchange for dollars, at a fixed exchange rate, while the dollar itself would also be redeemable for gold at a fixed exchange rate. While the dollar was not redeemable for gold by its citizens, foreign government still retained that option.

This system would, in theory, resemble the gold standard in place prior to 1913 so long as the US government restricted their dollar supply to their gold reserves AND other countries restricted their currency supply to their dollar reserves. This system would work provided the US did not abuse its exorbitant privilege (Amadeo & Brock, 2020).

During that era governments were dominated and guided by Keynesian economists, who viewed expansionist fiscal and monetary policies as a natural part of government policy. This led to monetary supplies becoming inflated beyond their reserves. This constant monetary and fiscal mismanagement by governments caused fluctuation in currencies value, resulting in imbalances in trades and capital flow (Ammous, 2018).

As a consequence of such fluctuations, the country who devalued its currency saw its products become cheaper in other countries – leading to more products being exported. In the Keynesian' system, devaluation is often followed by artificially low interest rates causing citizens to seek to purchase foreign currencies to protect their money (i.e., their stored labor/time) from

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16 FDR – President Franklin Delano Roosevelt.

devaluing. Without capital controls this causes capital flight, exacerbating the currency's devaluation as people sought better stores of value elsewhere.

On the other hand, countries that maintained their currency's value saw capital inflows, leading to their currency appreciating. While devaluation leads to more devaluation, the appreciation of a currency leads to more appreciation. This flow of capital proves that people prefer harder forms of currency over softer ones (Ammous, 2018).

Such abuses weren't possible under the classic gold standard as capital and goods would flow freely across borders, spontaneously adjusting with no intervention from a central bank. Under the gold standard, each currency's value would remain constant. Once central banks could expand the money supply through central planning, the monetary discipline of the gold standard was lost.

### 2.3.2. The Fraying of the Bretton Wood System

As the United States began to run large fiscal deficits and see rising inflation levels, their gold reserves began to shrink as countries sought out the hardest form of money which was gold. This loss of trust in the dollar, led countries to increasingly redeem their dollar reserves for gold in the 1960's (Alden, 2020). This chart demonstrates the loss of gold within the US reserves;

Table 3. US gold reserves as measured in metric tons

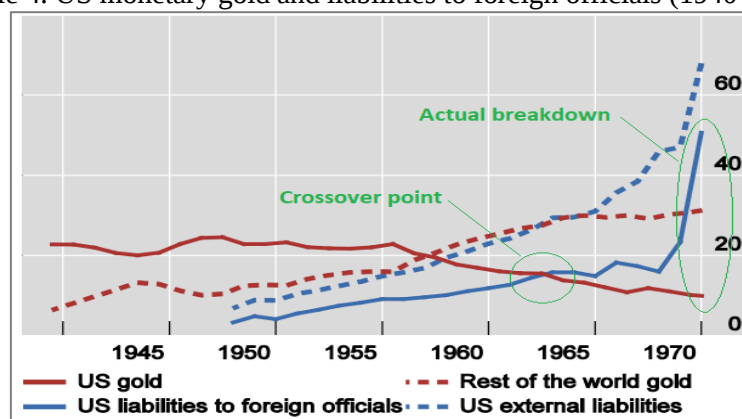


Source: Bullionstar (2021)

Although the US began with much higher gold reserves than foreign liabilities, within just a few years of the Bretton Woods system this gap shrunk. In the early 1960s, the US reached the crossover point where its foreign liabilities were greater than its gold reserves. At this point, the

system began to fray and became unworkable. In 1971, the Bretton Woods system broke down just as economist Robert Triffin<sup>17</sup> predicted it would.

Table 4. US monetary gold and liabilities to foreign officials (1940-1971)



Source: BIS Working Papers No 684 (2021)

Triffin, having observed that the system's design wasn't sustainable from the outset, warned Congress and the business world in what was later referred to as the Triffin Dilemma<sup>18</sup> (Nasar, 1993).

This trade imbalance triggered inflation in the US dollar and the gold market began to reflect this new reality. In 1968 the US government began to reprice the dollar against gold to acknowledge the inflation it had suffered. Simultaneously, countries such as France and Germany, having gold stored with the US Federal Reserve, started redeeming their dollar reserves for gold as they recognized the diminishing purchasing power of US currency. The dollar-gold exchange rate became unworkable. This dynamic proves that people prefer to hold reserves and wealth in the hardest form of money available, which at the time was gold (Paul & Lehrman, 2007).

<sup>17</sup> Robert Triffin was a Belgo-American economist who became famous for his critique of the Bretton Wood system – which became later known as the Triffin Dilemma (Nasar, 1993).

<sup>18</sup> The Triffin Dilemma (or Paradox) is the economic interest's conflict between short-term domestic and long-term international objectives when the currency serves as global reserve currency.

## Chapter 3 – The Fiat Standard

### 3.1. The Nixon Shock

In 1971 US President Richard Nixon ‘temporarily’ closed the gold window and in effect reneged on the Bretton Woods system. Thus began the era of *fiat currency*<sup>19</sup>. With the US gold reserves rapidly depleting and inflation on the increase, President Nixon decided to take the dollar off the gold standard, effectively ending the Bretton Wood system. He also instituted price controls to attempt to rein in inflation, but this effort failed as well and by the late 1970’s double digit inflation was everywhere (Ammous, 2018).

With the dollar no longer being pegged to gold, the dollar-gold exchangeability ended and gold’s price adjusted freely to market forces, the world’s reserve currency became fiat currency backed by nothing more than the full faith and credit of the USA. Even though this measure was announced as temporary, all attempts of revision were unsuccessful and the Bretton Wood’s system ended permanently. Ultimately, the US government had defaulted on its commitments and needed to come up with another plan for re-ordering the global monetary system with the US dollar at its center. For a period of several years the US dollar (and the world’s reserve currency) was backed by nothing.

The unbacked, debt-based fiat currencies (USD, EUR, GBP, YEN...) were then similar to the Jiaozi<sup>20</sup> currency of the 10<sup>th</sup> century issued by the Song dynasty in China (Ammous, 2018). As history has shown, fiat currencies are vulnerable to rapid increase in supply, leading to loss of purchasing power and the impoverishment of the citizens. Fiat, being categorized as easy money or soft currency (see section 1.1.), closely resembles primitive forms of money (described in section 1.2. and 1.3.) and can be characterized as an unsound monetary system (see section 2.2.1.). Fiat money is soft money. This inspired Friedrich Hayek<sup>21</sup> to write this:

*“I don’t believe we shall ever have a good money again before we take the things out of the hands of governments, that is, we can’t take it violently out of the hands of governments, all we can do is by some sly roundabout way introduce something that they can’t stop.”*

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<sup>19</sup> A “Fiat” is an absolute decree from an institution or person in command (Alden, 2020) – Fiat money is a common name for government money

<sup>20</sup> The Jiaozi was the first paper currency redeemable for gold and silver. The government controlled its issuance and ultimately suspended redeemability and increased the money supply until it collapsed.

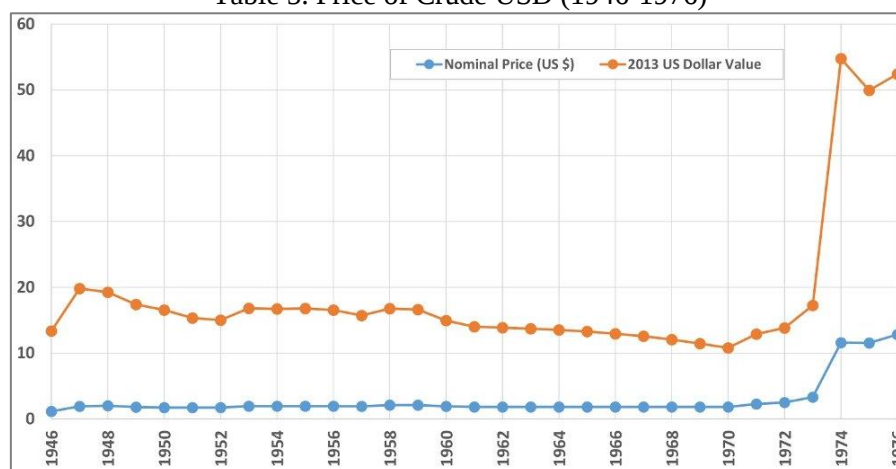
<sup>21</sup> Friedrich Hayek is an Austrian-British Nobel prize winner economist famous for his criticisms of the Keynesian welfare state and totalitarian socialism. (Caldwell, 2021)

### 3.2. The Petrodollar as World's Reserve Currency.

After Nixon closed the US gold window, the United States began to negotiate with Saudi Arabia to create a new world reserve currency. What emerged was the “Petrodollar” which to this day plays a crucial role in the world's reserve currency and the global economic system (Alden, 2020).

In the Petrodollar system, Saudi Arabia, as well as other countries in OPEC<sup>22</sup>, exclusively sell their oil for US dollars in exchange for U.S. military protection. In return the Saudis would buy US Treasuries with those dollars. It mattered not whether the oil buyer was from France or China, the deal was always closed in US dollars. This required any country that wanted to buy oil to have access to dollars by either earning it or exchanging it against their own currency. This created an incentive for other non-oil producing countries to start exporting their own products in dollars in order to later buy oil with their excess dollar reserves, mostly stored in US treasuries to earn interest. This new deal also created a massive increase in oil's value and price (Alden, 2020).

Table 5. Price of Crude USD (1946-1976)



Source: Rasoul Sorkhabi/EIA (2020)

#### 3.2.1. Money Supply Implications

What was never openly discussed and to this day hasn't been considered is the systemic risk Nixon's move introduced into the world's reserve currency. The ability to print unlimited amounts of the world's reserve currency with impunity leads to a radical overproduction of the currency which never ends well. In truth, through this Act, Nixon gave full control over the money supply to the FED. At the same time, fiat currencies were given monopoly status by

<sup>22</sup> Intergovernmental “Organization of the Petroleum Exporting Countries” (founded in 1960)

governments enacting laws preventing the creation of other mediums of exchanges as well as having taxes payable only in fiat (Ammous, 2018). Should another medium of exchange arise that threatens this monopoly, its creator or inventor runs the risk of facing jail time and punishment. This eliminated the threat of competition in money, adding to the systemic risk in our system.

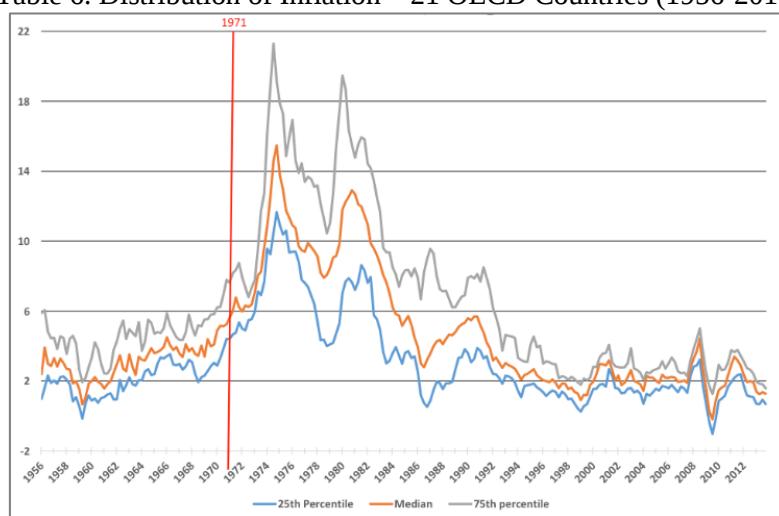
By ending the gold-dollar exchangeability, money's integrity was lost as governments around the world inflated their fiat currency through rapid increase in the money supply with no supervision or competition to keep them honest. Each country has a monopoly over their money within their borders (Lewis, 2021).

Additionally, it gave governments access to the gold they held and confiscated years before as if it was their own. Although gold had previously been denigrated by authorities since 1933, governments continued holding significant reserves, maintaining their gold reserves regardless of their statements.

Many historians blame the gold standard for the 1929 stock market crash and subsequent depression because it didn't allow governments to expand the money supply. The notion that governments and central banks need to control the money supply also became the unquestioned starting point of all (Keynesian) economics curriculum and political platforms (Lewis, 2021). With all governments officially freed from the fiscal and monetary restraint of the gold standard, central banks expanded the money supply in an unprecedented way.

Additionally, the inflation rate increase since 1974 (see Table 3.2.) has meant increasing prices and diminishing citizens' purchasing power.

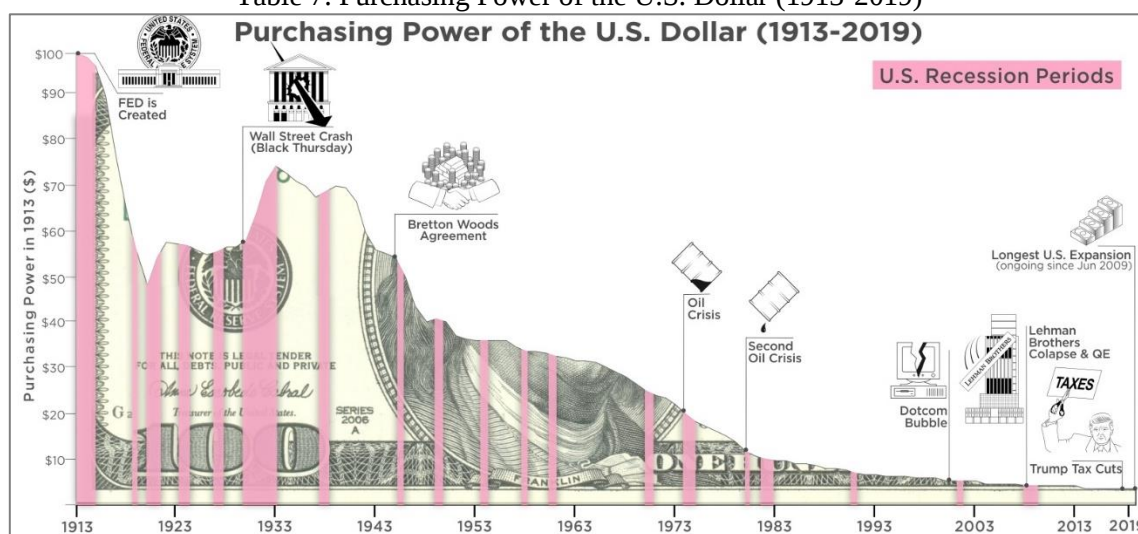
Table 6. Distribution of Inflation – 21 OECD Countries (1956-2012)



Source: OECD Main Economic Indicators through FRED (2020)

Sadly, the dollar has lost over 98% of its purchasing power since the Fed was created in 1913.

Table 7. Purchasing Power of the U.S. Dollar (1913-2019)



Source: Howmuch.net - Rise and Fall of the Dollar (2020)

Buddha's teachings tell us that honest money encourages righteous action while dishonest money prompts moral hazard. For example, today's food companies are reducing the quantity of food included in their packages while keeping the price the same which ends up delivering less value and therefore less purchasing power. This allows market actors to give the illusion of no inflation or price increases (Edin & Milo, 2018).

Monetary inflation incentivizes all companies and industries to deceive buyers, and it forces the sellers to choose between financial wellbeing and moral integrity.

### 3.2.2 International Trades Implications

This is the first time in history every nation in the world operates on a fiat standard and they maintain a monopoly on money within their borders. Given the record levels of money printing going on in each country it's hard to overstate the systemic risk of being in any fiat currency.

With countries running on their own fiat currency, international trades have reignited the barter system<sup>23</sup> problems of the coincidence of wants; the medium of exchange used in a country might not be wanted by the other in the exchange. Making this system inefficient as participants are occurring conversion costs when trading with one another (Lewis, 2021).

<sup>23</sup> System of direct exchange (See Section 1.1.)

### 3.3. The Fiat System

With the official end of the dollar-gold exchangeability in 1974, the Petrodollar became the base layer of our new monetary system. Through the years, major events have contributed to the evolution of this system (Alden, 2020). For example, this monetary system has rails for delivery of fiat that were created in the 1970's and the SWIFT system came into wide use.

#### 3.3.1. Government Controlled Money Supply

History has proven that, when governments have an unfettered ability to create money, they have always abused that privilege.

With unchecked power to create money, they always succumb to the temptation of increasing the money supply, serving their personal benefit and impoverishing all other holders of the currency. Our monetary system today operates much like the tyrants of yore. (Consider the biggest tyrants of history; Joseph Stalin, Lenin, Hitler, Mussolini, Kim Jong II... all ruled and operated in a government issued money system, allowing them to finance their totalitarian projects by constantly inflating their monetary supply) (Ammous, 2018).

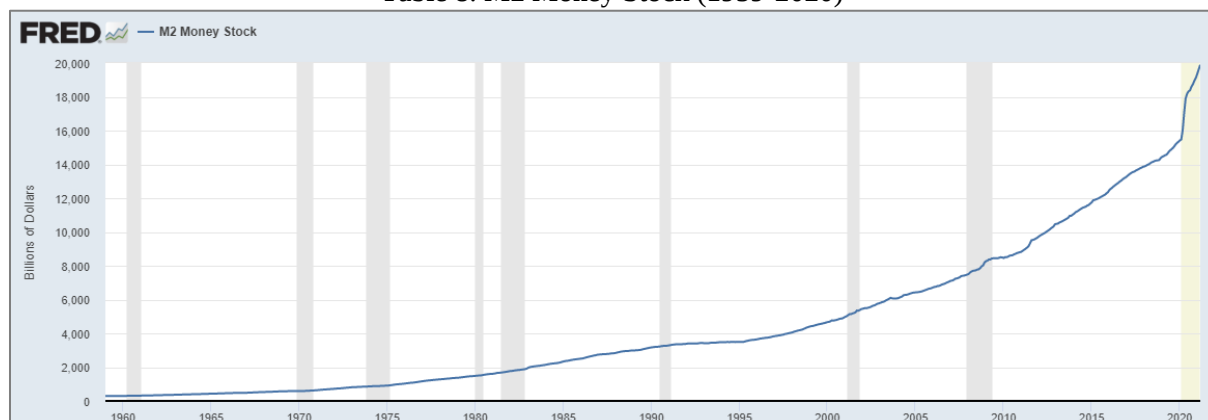
The issue with an unsound monetary system is that it gives governments almost unlimited power over its people. Money's hardness depends heavily on the government's ability and discipline not to inflate its currency. With no natural, economic or physical constraints in the current system, only political constraints will prevent a fiat currency from inflating. And there has never been a period in history where central bankers or governments haven't abused this absolute power to print money and debase their currency. Which ultimately expropriates the wealth of citizen's holding this currency for future consumption.

In terms of numbers, the US M2 Money Stock<sup>24</sup> sat at \$632.9 billion in 1971, we note a \$14.78 trillion increase in the span of fifty years with the M2 money stock reaching \$15.41 trillion as of 2020 (FED, 2021). This represents a 2,468.3% total increase or an Average Annual Growth Rate (AAGR) of 7.16% with a drastic 25.75% increase in 2020 (Calculation Table see appendix 2). The swift expansion of the M2 Money Supply from 1956 till 2020 can be visualized with the table below, capturing the real picture of governments inflationism.

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<sup>24</sup> The M2 money supply is an economic indicator often used to forecast inflation. It accounts for cash, money deposits and easily convertible near money.

Table 8. M2 Money Stock (1959-2020)



Source: Board of Governors of the Federal Reserve System (US) (2021)

The US government reported, in February 2021, it will discontinue publishing the M2 supply – which means less transparency. The timing of this move just so happened to come after a 25.75% AGR in one year.

Growth of 7.16% annually may not seem excessive on paper. Nonetheless, at such a rate, the money supply of a country doubles in just over 10 years as expressed by this calculation:

$$(1 + (1 * 7.16\%))^{10} = 1.996765$$

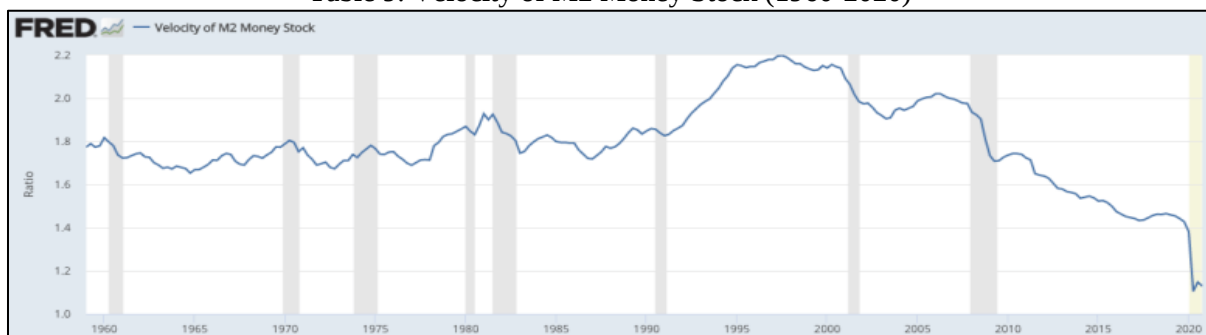
While this is true for “strong” economies such as the U.S., other countries have had their supply hyperinflate in previous years, devaluing their currency to almost nothing and impoverishing its citizens on a much larger scale. Venezuela, as an example, is currently facing hyperinflation<sup>25</sup> since 2016 with its Central Bank (CBV) officially estimating a total inflation rate of 53,798,500% from 2016 till 2019 (Cedrom, 2019).

Witnessing the constant increase in the money supply around the world, we also witness money’s velocity<sup>26</sup> dropping, meaning fewer transactions are happening. The following chart demonstrates that the expansion on the Fed’s balance sheet through “*Quantitative Easing*” caused the M2 velocity to accelerate downwards. People aren’t spending the money because there is more uncertainty. It’s a vicious circle that only seems to be getting worse as you can see from this chart.

<sup>25</sup> hyperinflation is reached once the inflation rate hits around 50% per month.

<sup>26</sup> Money’s Velocity is the number of times a dollar is spent to purchase goods or services per unit of time. Increasing velocity means more transactions are occurring.

Table 9. Velocity of M2 Money Stock (1960-2020)



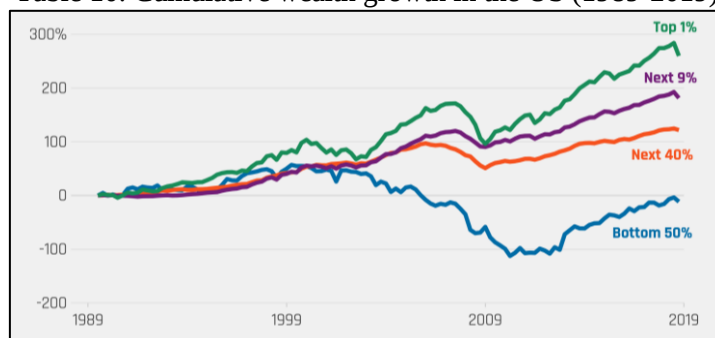
Source: Federal Reserve Bank of St. Louis (2021)

This diminishing velocity and record increase in units holds massive societal implications. This implies an increasing gap within the distributed wealth (Ammous, 2018). Newly created money, starting in the hands of the wealthy and banks, is stuffed into assets, rarely trickling down to the average citizens who are seeing their savings and spending power rapidly diminish, demonstrating that the central bank's flooding the economy with trillions of new units does not benefit the very people they claim to be rescuing.

The people closest to the central bank's money printers are benefiting the most from these supply increases, while less privileged citizens are witnessing their purchasing power dropping due to increased inflation rates and prices, ultimately reducing their economic stability (Breedlove, 2020). With a 7.16% AAGR, even a 5% annual wage increase would not be enough for citizens to maintain their ability to afford their current standard of living (house, car...) over time. This confiscation of wealth is now happening in every country around the world. The systemic fiat currency risk in every country is hard to overstate.

While governments will have us believe that the current social-economic context of Covid and people's propensity to save are the reasons of the widening gap, the cumulative wealth growth statistics sheds light upon the real picture since 1989.

Table 10. Cumulative wealth growth in the US (1989-2019)



Source: "Distributional Financial Accounts: Level of wealth by percentile groups" Fed (2019)

Unfortunately, not everybody benefits from money supply expansion.

This pattern, within unsound monetary systems, has always been a chief concern for Austrian economists. According to Ludwig Von Mises, one of the deans of Austrians economics, as long as money is controlled it will face too strong an incentive for inflation or confiscation (see section 2.2.3.). This enables governments to achieve their political goals without producing things of value for society and at the expense of the currency holders.

For Mises, sound money is how we defend our liberties, keeping money under the control of the owner, safe from government intervention and coercion. As he understood it “*The sound money principle has two aspects. It is affirmative in approving the market’s choice of a commonly used medium of exchange. It is negative in obstructing the government’s propensity to meddle with currency system*” (Mises, 1981). Mises believed strongly in government or central bank lack of control over money a necessary condition for its soundness.

Under a sound monetary system, governments must live within a budget, no longer having a central bank acting as buyer of last resort and printing money. Banks would need to operate under the same rules as any normal entities (Lewis, 2021). In his view, governments must be fiscally responsible and create value in order to stay in business.

In our unsound monetary system, the marginal cost of printing money is essentially 0. These zero costs of creating new monetary units makes it hard to support that fiat currencies holds value overtime (i.e., the key monetary property; scarcity) other than through government control over tax payers. In this system, the government has been able to expand its monetary supply and sell it to the public by calling it “Quantitative Easing” (Edstrom, 2019).

### 3.3.2. Quantitative Easing

Quantitative Easing, in simplistic terms, refers to a Federal Reserve method of creating new dollars (Lewis, 2021). While it isn’t literally printing money, its functionally the same. Digital dollars are created on the FED’s ledger and utilized for the purchase of government debts (i.e., US Treasuries) or mortgage-backed securities<sup>27</sup> (MBS) for instance.

In the early 1900’s central banks had to have sufficient cash or gold on hand to serve in this role. Today’s modern banking systems are almost entirely electronic which eliminates the need for physical cash. This allows central bankers to create trillions of dollars at the push of a button.

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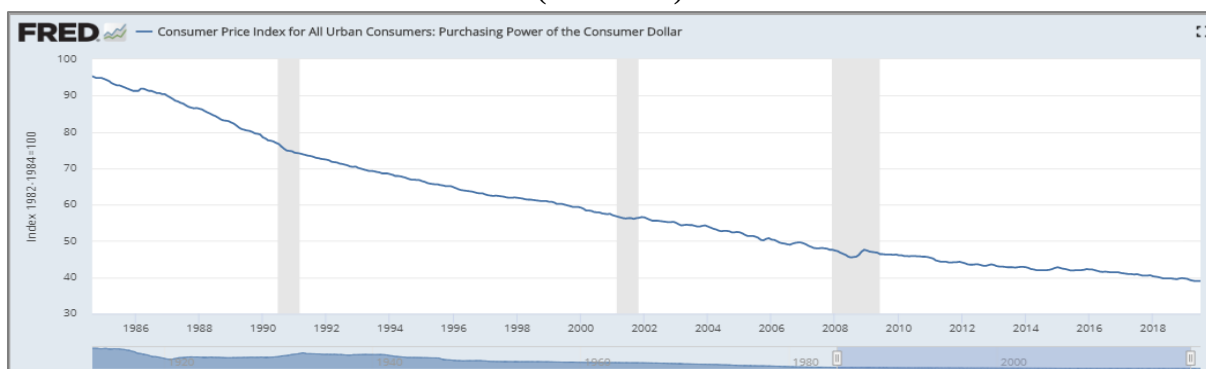
<sup>27</sup> mortgage-backed securities are bundles of home loans bought by investors from the banks issuing them. Making the bank an intermediary between them and homebuyers.

Today we make a distinction between banks having liquidity issues versus banks being insolvent. A bank can be solvent and yet be facing liquidity issues which could trigger a bank run or regulatory scrutiny. But liquidity issues in one bank can lead to another bank facing liquidity issues and cause systemic risk. This systemic risk can cause a cascade effect as one failing bank could lead to another and a domino effect. This leads to banks becoming “*too big to fail*”. This is exactly what transpired during the 2008 financial crisis in the US (Ammous, 2018).

The presence of central banks having the power to bail out member banks created a moral hazard. Banks that are *too big to fail* take tremendous risks with depositor’s funds. Knowing that central banks will bail them out to avert a systemic crisis allows banks to take greater risks without facing consequences – if they win, they keep the profits, if they lose the government (essentially the taxpayer) bails them out and the losses are socialized (distributed amongst all savers of the currency). These central banks keep banks, that allocate capital poorly, from going out of business and the financial industry just keeps getting larger and misallocating capital as those banks never go out of business (Song, 2020). Meanwhile, the systemic risk of catastrophic failure of the world’s reserve currency builds like a house of cards.

As more dollars are created through QE, the dollar loses its purchasing power but QE’s effects are transmitted gradually with the expansion of the credit system within the economy. Its design allows banks to expand credit by multiples for each added dollar to the system (Fractional Reserves Banking, section 2.2.2.2.). The credit is later used by consumers to purchase goods, causing prices to increase while the dollar value decreases, diminishing its purchasing value and expropriating citizen’s wealth.

Table 11. Consumer Price Index for All Urban Consumers: Purchasing Power of the Consumer Dollar (1987-2019)



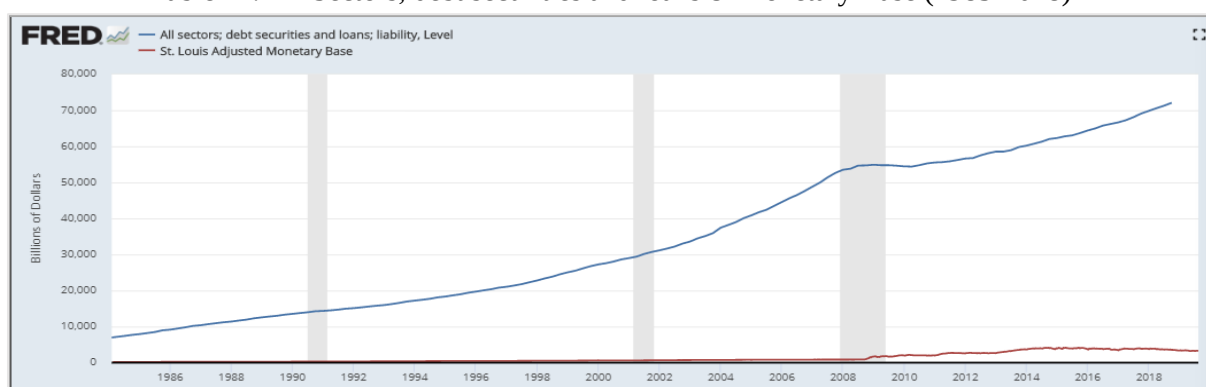
Source: U.S. Bureau of Labor Statistics(2020)

While Keynesian economists believed QE was a necessary tool, in truth it created a vicious circle where even more QE is necessary (Ammous, 2018). With prices increasing through inflation, the average citizen, loses purchasing power, and sees his wealth destroyed now requiring loans to afford what you could previously (housing or cars for instance).

By the 2008 financial crisis, the Fed had been lowering interest rates (explained in next section 3.3.3.) and increasing the money supply as the solution to every recessionary business cycle, leading up to the crisis. By continuously increases the money supply and lowering interest rates to induce credit expansion, the banking system had become overleveraged (Alden, 2020). In the Fed's system, each dollar is leveraged 40:1<sup>28</sup>. Rather than allow the system to adjust as a natural market function, the Fed's perpetual response is to increase the money supply to promote growth and create ever more credit. It was the only tool in their tool box. Using debt to solve your economic problems has diminishing returns, like using gasoline to put out a fire.

Through each round of QE, the Fed has inadvertently created greater instability in the economic system. With too much debt and too few dollars circulating in the system we are watching systemic risk build by the minute. By pursuing the same monetary policy for decades, it created an environment that triggered an even bigger government response in 2008. In 2020, the Fed increased the money supply by \$3.6 trillion to avoid a financial collapse. While Subprime loans were stealing headlines during the 2008 crisis, the real issue was the cumulative effect of having sustained economic imbalances in the credit system through too many recessionary cycles (Alden, 2020).

Table 12. All Sectors; debt securities and loans & Monetary Base (1985-2018)



Source: Board of Governors, St. Louis Fed (2020)

Today, our youngest generation thinks it's normal being forced to risk their money in the stock market to protect them against the massive loss of purchasing power brought on by central bank

<sup>28</sup> \$1 of deposits could produce \$40 in loans.

monetary policy (Song, 2020). The typical wage earner today can't afford housing, education, and healthcare for their family. In the 1960's it was possible for one wage earner to afford a middle-class lifestyle. In the 1970's more households needed two wage earners to live that same lifestyle. And today millions of Americans are unable to afford to live independently on their wages without government (i.e., taking loans or government stimulus money) or family assistance (Ammous, 2018).

Manipulating the money supply and keeping interest rates artificially low created false price signals in the economic system. Arguably the global pricing mechanism has been broken for decades which has led to a massive misallocation of resources. The imbalance between supply and demand leads to instability and fragility across the system. And all QE has done is feed the instability, inducing further credit expansion, while the system is never allowed to deleverage naturally.

Quantitative easing is accepted as a policy response to economic stagnation but it's losing its punch. Practically speaking, the central bankers attempted to solve the debt problem (the origin of the instability in the system) by creating even more debt.

### 3.3.3. Interest Rates

Following 2008, liquidity insertion through QE and interest rates lowering have been the US governments primary tools to keep its economy afloat. Through QE, the US government artificially inflates asset prices by injecting more money into the system, giving the illusion of wealth and growth. Lowering interest rates, on the other hand, allows for business to increase their gross profit margin, again giving the illusion of an economic growth.

Manipulating interest rates actually modifies individual's time preferences (i.e., time horizon, see section 2.2.1.). From Austrians economics theories, we value sound money that protects our life force and wealth across time – giving people bigger incentives to plan for their future. If our money were held in melting ice cubes, we'd spend it fast. Based on this reality, an ideal money would have a fixed supply, and be safe from government or central bank over production. A perfect store of value. In such a system, the only way to acquire more money in a non-criminal way would have to be by creating something of value in the marketplace (Breedlove, 2020).

When governments keep interest rates artificially low or negative and inflate their money supplies it creates an incentive for immediate consumption. When there is no longer economic

benefit from saving money, we borrow from the future to pay for spending in the present. Unsound money actually loses its value through time and causes citizens to seek out harder forms of money. In a fiat system, indulging immediate pleasures is the best course of action economically. ZERP (Zero Interest Rate Policy) is one of the factors that has increased risk for everybody in the system (Ammous, 2018). Worse, NERP (Negative Interest Rate Policy) is now thought of as a reliable plan for governments. Basically, taxing individuals for saving money. Said differently, there is no way to store your life energy (labor) across time like there was during the gold era.

### 3.3.4. Debt Based and Surveillance Capitalism

Our monetary system is based on debt, and it incentivizes individuals and companies to acquire loans for immediate consumption (Lewis, 2021). Debt reduces the wealth previously acquired during the sound money era where individuals had the incentive to save money. The most robust form of capitalism encourages saving, with individuals delaying gratification by investing in the future, while debt fueled consumption brings the exact opposite. Debt based money is now the backbone of our global monetary system and the debt burden increases every year<sup>29</sup>.

Nowadays, many mistakenly blame capitalism for our world's economic problems. That's a myth. The reality is our economy depends on a socialistic institution; the central bank. True capitalism gives each person the exclusive right to the fruits of their own labor. Whereas socialism gives the government or central authority the power to confiscate our labor, life force and time, through inflation, taxation or in some cases outright confiscation. Inflation can be understood as a stealth form of taxation. As these transactions having not been created consensually, the exchanges can be defined as socialist and extortive (Ammous, 2018).

Today, through technological advancements, money is being digitized rapidly and is being used to track and control our behavior. Most governments today want to eliminate cash because it gives them greater tracking ability. Some governments are removing physical cash by outlawing certain paper bills, such as the 1000 rupee note in India for instance, forcing more people to stored their wealth in government supervised banks. This makes people's money vulnerable to confiscation, greater control and bail-in's, like the one seen in Cyprus in 2013 (O'Brien, 2013), and capital control. Governments have the power to confiscate money from

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<sup>29</sup>To help visualize just how colossal the debt levels have become, see appendix 3

any bank it controls, and inflate the money supply (devaluing people's wealth), while rewarding insiders with newly printed money. They can also impose draconian taxes, punish people that avoid them, and make certain denominations worthless to discourage cash usage – increasing their financial surveillance. With governments controlling the money, our money is no longer a reward for having produced value but from government official's obedience as they have the power to freeze our accounts (Breedlove, 2020).

### 3.4. Covid-19 Situation

The year 2020 and the Covid-19 pandemic triggered events that exposed the systemic risks within our monetary system. It gave businesses and individuals 20-20 vision on the system's instability.

The government's fiscal responses in 2020 were the same as in 2008, using QE, zero bound and negative interest rates to attempt to stimulate the economy. Only this time the 2020 response to economic stagnation and loss, brought on staggering levels of economic stimulus as shown by the total asset values (see Table below) and the M2 supply increase (Table 3.4.)

Table 13. Total Assets in USD (Less Eliminations from Consolidations) (2004-2020)



Source: Boards of Governors of the Federal Reserve System (US) (2021)

With governments enforcing an economic shutdown, historic drops in revenues were being reported in many industries. It brought many companies to the brink of insolvency because they held too much debt and had little or no cash reserves and cash from operations.

Such a radical increase in the money supply drastically distorts the pricing mechanism and causes several kinds of inflation. As has been shown throughout history every government and central bank that prints too many units creates systemic risk that leads to catastrophic failure of the currency. The most recent examples are Venezuela, Argentina and Zimbabwe. Given the central bank and government response to the pandemic worldwide there is reason to think many fiat currencies will eventually suffer the same fate.

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## *Part II. Bitcoin's System*

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## Chapter 4 – The Bitcoin Standard

In January 2009, following the economic collapse of 2008, the pseudonymous Satoshi Nakamoto mined the Genesis block of the Bitcoin network (Wallace, 2011). The Bitcoin network was created to provide a better form of money by fixing many issues found in the world's existing monetary system including unlimited money printing, centralized control, and keeping the price of money (interest rates) artificially low.

With the extraordinary systemic risk in our monetary system exposed in 2008 along with the implementation of short-term solutions from governments, the appearance of Bitcoin was fortuitous. Bitcoin would have been too immature an asset in 2009 to be an alternative monetary asset. However, it's growth in twelve years is nothing short of astonishing.

Since its creation, this technology has grown tremendously, reaching on February 19th 2021 a market capitalization of \$1 trillion (Reuters, 2021) and is witnessing a worldwide growing adoption. But what is "Bitcoin"?

### 4.1. What is Bitcoin?

For starters, it is important to understand that Bitcoin can be split and described as two different things; the protocol and the currency. "Bitcoin" is the protocol and payment network while "bitcoin" is the currency, the digital token.

#### 4.1.1. Bitcoin

Bitcoin (capital "B") is a peer-to-peer electronic cash system, it allows people to send or receive money across the internet without needing a trusted third party, therefore removing the need for middlemen such as banks. It's a trustless system based on proof of work using cryptography rather than trusting governments and central banks and is completely voluntary (Pritzer, 2019).

Bitcoin is powered by open-source code known as Blockchain, which creates a shared public ledger of every transaction going back to the genesis block. All pending bitcoin transactions, during a ten-minute period, are organized by miners into a block that is only added to the chain if the miner solves the required mathematical puzzle. He then earns the block reward for his work. This block reward pays the winning miner 6.25 bitcoin from 2021 till 2024 (the currency) and transaction fees for that block. Each block contains roughly 2500-3500 transactions (Antonopoulos, 2015). These blocks are strung together to form the "*Bitcoin blockchain*". The immutability of the ledger means that it is a permanent record of every transaction going all the way back to 2009. The code used to secure this ledger is open-sourced, meaning anybody can

have access, read and verify transactions. Most importantly, the Bitcoin protocol (i.e., Bitcoin's blockchain) has never been hacked. And the longer the Bitcoin network runs the harder and more impregnable the network becomes. Because it runs over the rails of the modern-day internet, it is sometimes referred to as MOIP (Money Over Internet Protocol) (Antonopoulos, 2015).

#### 4.1.2. bitcoin

By contrast, bitcoin (small “b”) is the first truly scarce and decentralized digital money, separating money from state control and manipulation. It is described as a “cryptocurrency” because it uses cryptographic coding to secure the system. It's a digital form of currency, virtual money, often referred to as digital gold or gold 2.0. which refers to its use as a store of value (Powell, FED Chairmen, 2021).

It represents humanity's first sound digital monetary system. It's money that isn't issued or controlled by any central authorities or human beings, it is coded and run by algorithms on an open-sourced ledger that is tamper proof through a security protocol called proof of work. It's our first alternative to the unsound government money referred to as fiat money (Ammous 2018). Bitcoins are stored on digital wallets. Each wallet has a public and private key. The public key allows people to send money to the wallet while the private key allows the owner of the wallet to initiate and sign transactions by providing “proof of authorization”. Different kind of wallets exists; hot wallet (stored on a cloud, trusted server) and cold wallets (encrypted portable device holding the keys).

New bitcoins are “mined” by digital miners, every 10 minutes on average, through the resolution of complex mathematical problems that require advance technological equipment's to solve (currently ASICs). The resolution allows a new block to be linked to the existing chain, confirming the transaction of that block for other users of the system. Miners are rewarded for their efforts in bitcoins. Because mining requires heavy electricity usage, miners are incentivized to find and use the cheapest form of energy which usually means renewable and stranded energy. Because these machines can be turned off and on based on demand, they are helping solve environmental issues while securing the monetary system through cheaper sources of energy (Pritzer, 2019). The more energy used, the more secure the network – the walls of the vaults are getting thicker.

Bitcoin is an absolute scarce currency. Its supply is limited at 21.000.000 and each bitcoin is divisible into 100.000.000 Satoshi's (Lucian, 2019). On the day the first bitcoin was mined in

2009 the algorithm was set such that it allowed so many bitcoins to be mined about every ten minutes. The amount paid to miners for each block has been decreasing every 4 years when the halving occurs, splitting the miners' rewards in half, until no more bitcoin can be mined, approximately in 2140 (Antonopoulos, 2015). Bitcoin is permissionless which means it can be bought by anyone on cryptocurrency exchange platforms such as Kraken, Binance, Coinbase... or through peer-to-peer networks who are not part of these exchanges.

While the previous information may feel overwhelming to the reader, we will deepen our understanding of the Bitcoin's system in the following sections.

#### 4.2. Bitcoin's Blockchain

Blockchain technology is a critical part of Bitcoin, they are interdependent; one could not exist without the other. While bitcoin, the monetary asset, needs the blockchain to function, a blockchain could not function without a native digital currency (here bitcoin) to incentivize resources (like miners) to secure it. A blockchain that does not secure a valuable asset won't be very secure itself. Even though I made a distinction in this paper between bitcoin the money and Bitcoin the network they are inseparable. Without one, the other is effectively meaningless.

Bitcoin is the first blockchain application that was created by Satoshi with the idea that banks or middlemen are not needed for a monetary system. As explained in Satoshi's white paper, *"Bitcoin is the creation of a purely peer-to-peer version of electronic cash allowing online payments to be sent directly from one party to another without going through a financial institution"* (Satoshi Nakamoto, 2008).

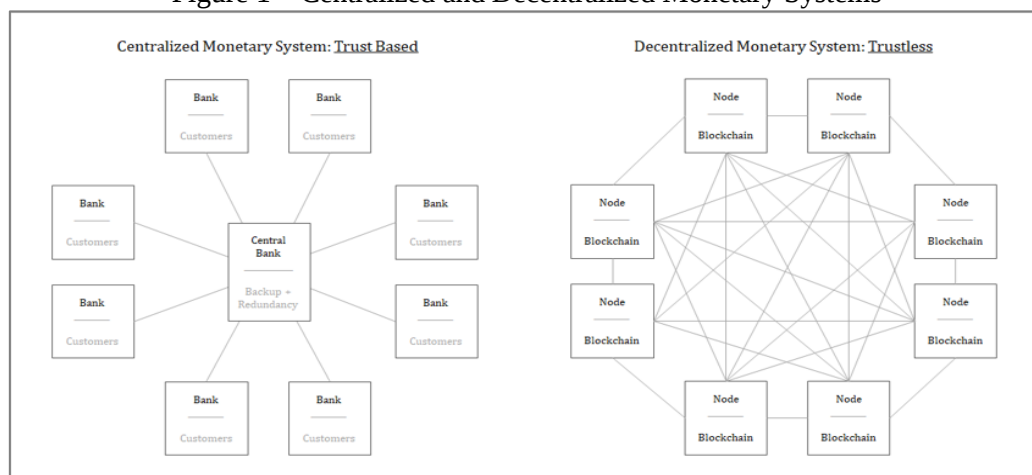
At its core, bitcoin's blockchain technology is a digital decentralized distributed ledger allowing miners to make trillions of guesses per second using specialized equipment that is impossible to hack while the tens or hundreds of thousands of people run nodes<sup>30</sup> to verify the miner's solution. The best analogy to understand this is the game of Sudoku where it takes a much longer time to solve the puzzle and almost no time at all to verify that the puzzle got solved. This system, being decentralized isn't run by a company or person. The bitcoin network provides democratic governance allowing anyone to improve it while guaranteeing the information's integrity through a consensus protocols embedded in the algorithmic code on which the system is based.

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<sup>30</sup> A node is a powerful computer running the bitcoin software and validates blocks and transactions.

The cryptographic algorithm of this decentralized protocol maintains the network's data immutability and trust. The network uses nodes to create, verify, validate and update the transactions in each block of the blockchain. The system being open-sourced implies that any IP addresses willing to participate in this trustless system have the ability to do so from their personal devices (when connected to the internet) and act as nodes by downloading bitcoin's software (Tucker, 2020).

Figure 1 – Centralized and Decentralized Monetary Systems



Source: *Unchained Capital (2021)*

When a new transaction enters the system, the request is broadcasted on to the network. The consensus protocol, through the proof-of-work<sup>31</sup> (PoW) protocol, validates and creates the transactions and a new block is created on the ledger once verified.

Separately, Bitcoin blocks have limited amounts of space and include approximately 2,700 transactions per block. With 10 minutes interval  $24/7/365$ , the network's capacity is approximately 145 million transaction a year, the equivalent of 4.6 per second, while Visa processes on average 4.000 transactions per second, the blockchain isn't as efficient as it could be (Pritzer, 2019).

The immutability of the ledger is vital for the blockchain to be reliable. If settlements of value on the ledger could not be reliably considered final, no individuals would reasonably trade real value in return for its native currency (i.e., bitcoin). If transactions could be altered post-trade, the buyer could easily wind up in possession of both the bitcoin and the goods acquired. The immutability of the ledger is therefore critical to bitcoin's function.

<sup>31</sup> Bitcoin's asymmetric PoW puzzle involves using a hash function (explained in section 4.4. Mining)

## 4.3. Mining

### 4.3.1. Fixed Supply

Historically, during inflationary time, gold was the traditional hedging asset of choice for investors as it was the scarcest asset available. Scarcity is a key property as without supply limitations, inflation always arises and destroys value (See Section 1.2.)

However, Bitcoin, through a fixed monetary supply of 21.000.000 bitcoin controlled by an algorithm and governed by market consensus mechanism, created an undistorted economic system where the supply cap is enforced by the distributed network of independent nodes (Wallace, 2011).

By relying on the distributed knowledge of market participants, it alleviates the need for a centrally controlled monetary system. Its finite supply of 21 million coins makes it absolutely-scarce. There will only ever be 21 million bitcoins with the last of it being mined around the year 2140. Making bitcoin a better option than gold in terms of scarcity.

It also enables accurate economic price calculations as well as eliminate the ability for any institutions to go against the market by increasing the money supply. With price mechanism being described as “*the greatest distribution system of knowledge in the world*” (Hayek, 1945), Bitcoin’s fixed supply makes the case for it eventually becoming the best distribution system of knowledge.

With a universally known supply, bitcoin has a fixed stock to flow ratio denominator of 21 million unlike fiat currencies that is unlimited, making bitcoin more reliable as well in terms of store of value.

$$\frac{\text{Current stock of monetary units (STOCK)}}{\text{New production of monetary units (FLOW)}} = \frac{1}{21.000.000} \text{ bitcoin} > \text{fiat } \frac{1}{\infty}$$

Because of that supply limitation, while demand is increasing for bitcoin, there can be no supply response as new bitcoins follow a predetermined schedule. Making bitcoin’s value increase even higher (Lewis, 2021).

### 4.3.2. Minting bitcoins

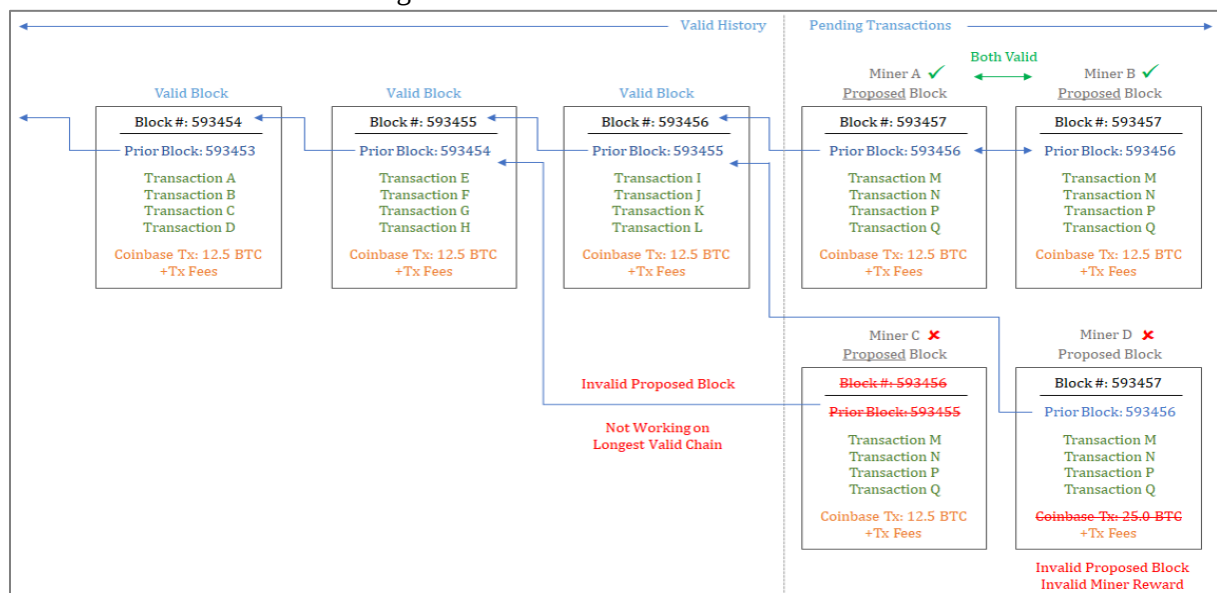
Blocks on the Bitcoin’s blockchain are records of past transactions and proof of ownership at any point in time, with each passing block updating the state of the network. The process of generating new bitcoins happens through the resolution of the mathematical puzzle (i.e., proof

of work) by miners. The PoW protocol is a race to solve an energy intensive asymmetric puzzle required for a new block to be created. It is similar as “rolling a die in a lottery with a die composed of as many sides as there are atoms in the universe” (Pritzer, 2019). Which implies that this system is very energy consuming and real world costly.

Once a miner has won the race, he submits his work for the network to validate his block. All other miners then start trying to solve the next puzzle following the previous validated block. In other word, miners are in charge of continuously validating the network’s history and clearing pending transactions while securing the network in the process.

Created blocks represents data sets including different elements; the reference to the prior block on the chain, the pending transactions waiting for validation, the compensation and fees due to the miner.

Figure 2 – Blockchain’s block validation



Source: *Unchained Capital (2021)*

Nodes on the network then check and validate those blocks, ensuring that consensus is enforced. If one of the previous stated elements are found to be invalid, the block is not added to the chain and the miner loses its potential reward.

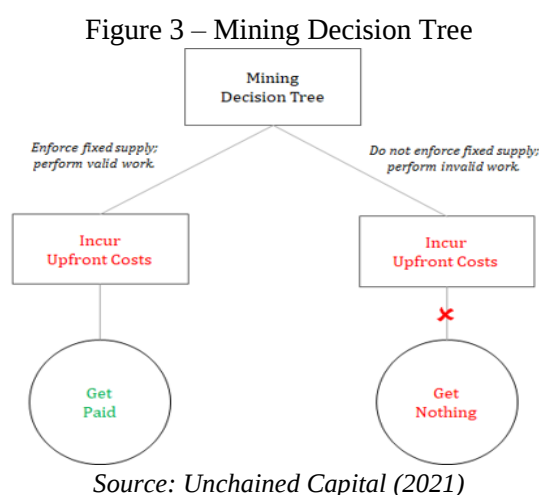
New bitcoins are created, on average, every 10 minutes when the asymmetric mathematical puzzle to create new blocks on the blockchain is solved. If the next block happens to be solved faster or slower than in 10 minutes, the network automatically adjusts the difficulty<sup>32</sup> of solving

<sup>32</sup> The required number of zeros at the beginning of the hash

the puzzle, though a process called the *difficulty adjustment*, in such a way that blocks will be solved and transactions validated on average every 10 minutes (Antonopoulos, 2015).

Newly issued bitcoins are a form a compensation for miners along with transaction fees. The miners are compensated for securing the network and running the cryptographic hashing function required to solve bitcoin blocks. The cryptographic algorithm used in Bitcoin is SHA-256 (Secure Hash Algorithm), it produces unique and irreversible hashes for each block. To keep it short, a hash can be viewed as a block's personal finger print.

By solving those blocks, miners' clear transactions who are then validated by the network. And in return, they receive payments the blockchain's native currency; bitcoin. Through the networks structure, miners are incentivized to comply with the rules of the network. Any attempt of cheating by proposing an invalid block to the system will only find itself not being validated by the network.

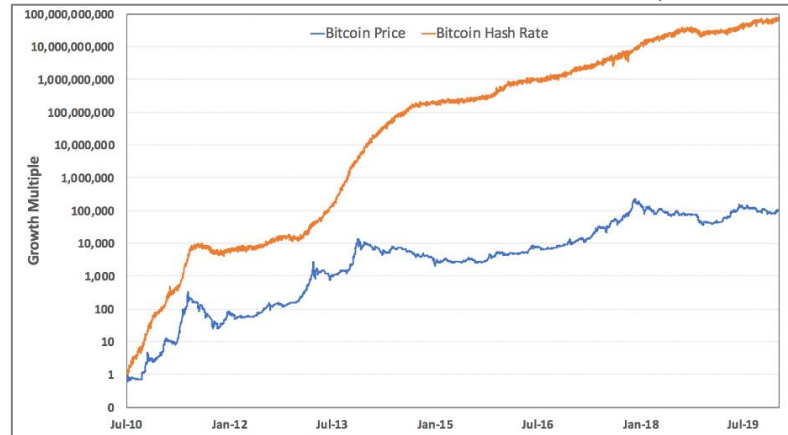


Because of the significant upfront costs (equipment and energy) miner most incur when solving the puzzle through SHA-256, they are incentivized to produce honest work as invalid work would incur high costs for nothing in return, as nodes would reject the invalid block immediately. This trustless system forces individuals to work within the consensus at all time. Again, the more energy used (i.e., the hashrate<sup>33</sup> increases), the more secure the network – the walls of the vaults get thicker. As hashrate power increases, bitcoin's value increases which leads to a higher incentive to produce honest work for rewards while invalid work becomes even more costly and punitive, and the cycle continues (Lewis, 2021).

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<sup>33</sup> Total computational power being used to mine and process transaction on the blockchain.

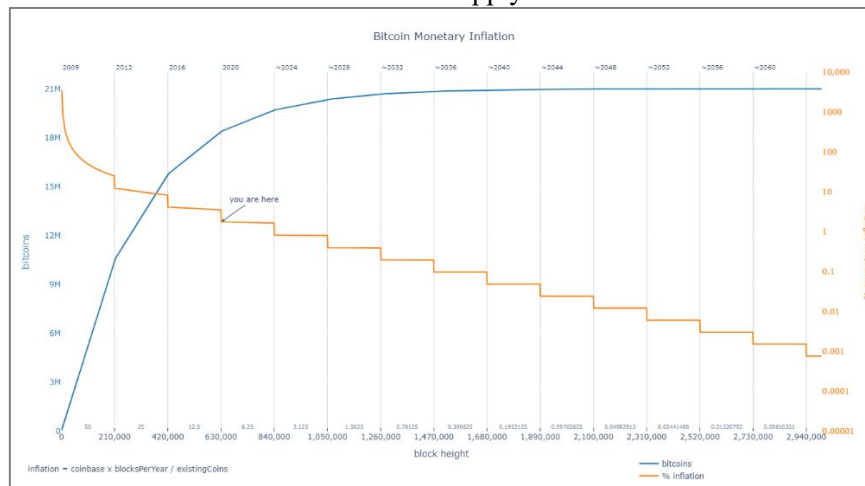
Table 14. Bitcoin's Hashrate Power and Price Growth (2010-2019)



Source: Unchained Capital (2021)

The amount of bitcoin created, however, varies based on a predetermined fixed schedule. While the supply is set to increase every 10 minutes, the number of new coins issued per block decreases with time. Every 4 years, a *halving* cycle occurs, splitting the miners coin rewards in half. The last halving occurred back in 2020, setting the amount of newly issued coins per block mined at 6,25 with the next halving set to occur in 2024 where 3,125 new bitcoins will be issued per block generated. That process will repeat itself until every bitcoin's are mined in approximately 119 years (i.e., 2140) (Antonopoulos, 2015).

Table 15. Bitcoin's Supply and Inflation



Source: bashco.github.io (2015)

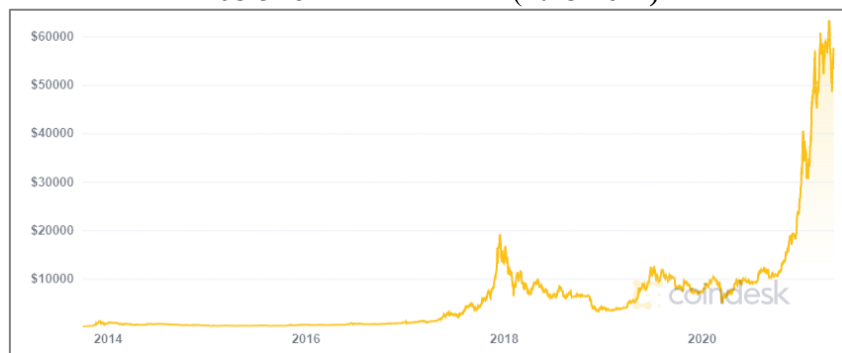
#### 4.3.3. Bitcoin's Value

Contrary to popular belief, bitcoin is actually backed by something, which happens to be something that the fiat system does not have; credibility of its monetary properties. These include scarcity, transportability, divisibility, durability among many others. The fact that bitcoin's protocol can prevent the currency from inflating and being spent multiple times from

its ability to secure the network on a decentralized trustless basis is what gives bitcoin its value (Tucker, 2020).

Along with its perfect information system, through every individual being able to see the rules and verify their enforcements, bitcoin's symmetrical system offers a world with perfect market competition, allowing competition without unnecessary regulation and enabling wealth generation (Edstrom, 2019).

Table 16. Bitcoin's Value (2013-2021)



Source: Coindesk (2021)

With the fiat monetary system flaws being non-existent in bitcoin's system, it offers a fixed and transparent monetary system to the world. The correction of these flaws is what brings value to bitcoin.

#### 4.4. Third Party

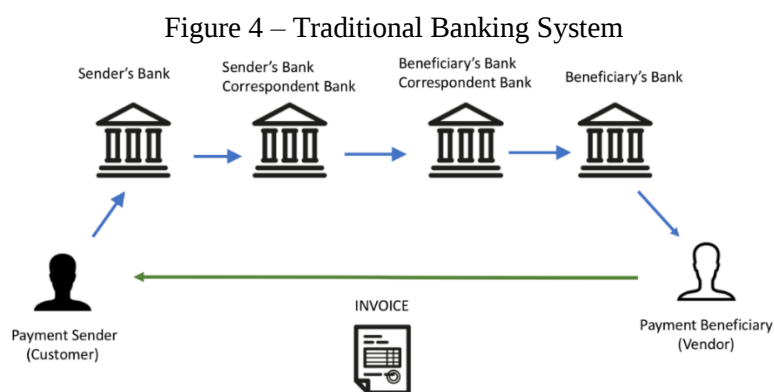
Prior to 2009, the citizens of each country were forced to use a centralized fiat system with no other alternative. That changed with the Bitcoin's Genesis Block in January 2009. Imagining a future with the separation of money and state has been possible ever since.

A centralized system is, by definition, based on trust. Trust that a third party will act ethically and responsibly within its privileged position. While centralized systems certainly had their uses in the past, their lack of accountability in our current financial system has led to an abuse of their privilege during the last century. Which has led to widespread mistrust in these middle men. History's unbroken string of economic crises and loss of trust in financial institutions led to Satoshi Nakamoto's invention of bitcoin (Breedlove, 2020).

Bitcoin is a pure voluntary system that offers individuals the choice between both systems; one that requires absolute trust in central bankers, and another that enables individuals to take control of their own monetary sovereignty while also promising an unmanipulable supply.

Because of the overleveraging and abuses in the existing financial system, future rounds of QE are a certainty, meaning that a debasement of our currency is virtually guaranteed.

In our current banking system, a transaction goes from the payer's bank account to the seller's account by going through multiple banks, each taking their cuts in transaction fees, slowing down the process as well as introducing inefficiency costs. In all, it takes 3 days to settle most transactions.

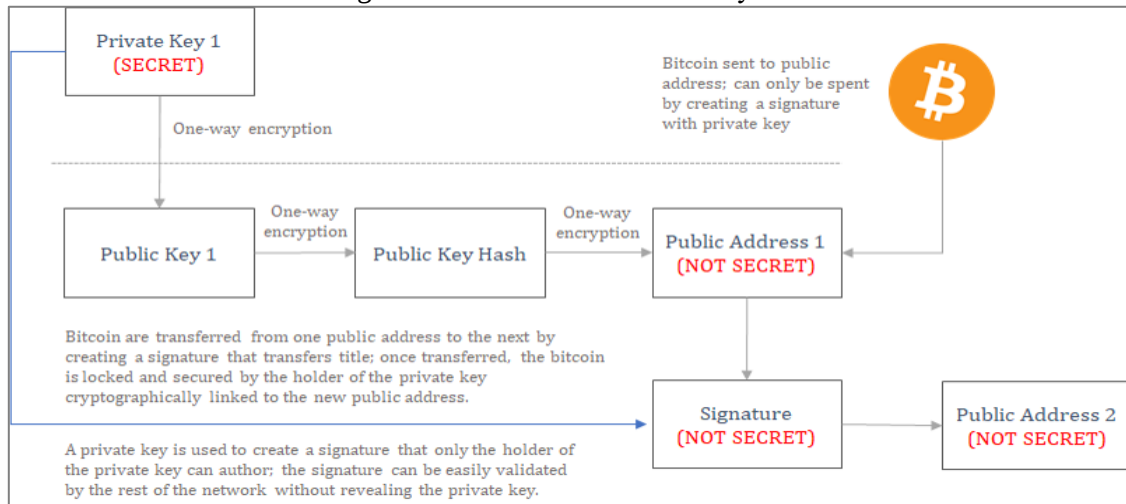


*Source: Ikaros Matsoukas(2020)*

We are now twenty years in the 21st century where it's possible to send any electronic information of any size anywhere in the world instantaneously for free, except money (Tucker, 2020).

Yet, bitcoin not only improves the structure of the system by removing the middle man of the financial system (i.e., central banks), it also makes financial transactions much faster and efficient. When a valid block is broadcasted to the network, bitcoins are transferred from one public address to another in seconds. Public addresses (or public keys) can be shared without any safety concerns, it represents our bank account's IBAN in short. Private addresses (or private keys), on the other hand, are the digital signatures required to create a transaction from a wallet, it is what grants access rights to the stored bitcoin (Pritzer, 2019).

Figure 5 – Bitcoin's Transaction System



Source: *Unchained Capital* (2021)

With blocks being created on average every 10 minutes, a bitcoin transaction settlement is much faster than any transaction settlements in our current banking system.

With large populations no longer trusting their governments with their money, the adoption curve of bitcoin's decentralized system has been unprecedented, growing from zero users to about 150 million users of the network in twelve years.

As individuals opt in to bitcoin, the cracks in the existing system will only become more pronounced. This will lead to more central bank intervention through QE which will lead to the wider adoption of bitcoin. The lack of liquidity in the first system, pumped into assets to support the credit system, will only trigger faster quantitative easing for the system sustain itself.

#### 4.5. Storing Bitcoin

As cryptocurrencies are by definition digital, storing them in a physical form is not a possibility. Therefore, in order to hold a cryptocurrency such as bitcoin, one must first open an online wallet. Similar to our typical bank accounts, our digital wallet comes with an "address" (i.e., the public key) and works like our typical IBAN.

Tied to that same wallet is the private key, allowing the owner of the bitcoin to sign off on transactions. While this decentralized system offers total sovereignty, it is important to mention that the loss of the private key will mean losing the account and its holdings as no central authorities have control over our account.

There are different ways of storing our bitcoin, some more secure than others. The least secure option would be an online wallet, meaning that the keys to the account are held by a third party. While this type of wallet is the easiest to setup, one must not prioritize convenience over safety. With safety concerns over personal cryptocurrency holdings in mind, many opt for a “cold storage”, meaning that the holdings are held on a digital wallet offline (Antonopoulos, 2015).

Other hybrid way of holding bitcoins exists; paper wallet, cloud wallets, mobile wallets... all having to be considered when wanting to buy crypto as they're based on different risk profiles.

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### *Part III. Bitcoin's Perceptions*

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## Chapter 5 – The Perceptions on the Bitcoin Standard

Having now gone through part. I, setting the foundation of “*what is money*”, along with its key characteristics and properties, as well as understanding monetary standards, the past evolution towards our current fiat standard and the flaws that find themselves deeply rooted within our system, and part. II, analyzing the alternative Satoshi Nakamoto offered to the world with the Bitcoin Blockchain and now having a better understanding of its system, we can analyze and attempt to understand why so many already find themselves on Bitcoin’s side, but most importantly decide whether or not the Bitcoin Standard is truly an opportunity or a threat in developed economies.

Many people have already raised that question in the world. The historical, social and economic context has triggered many to seek economic alternatives to the dropping purchasing power of our fiat currencies. While gold has always been historically known as a hedge against inflation, many have chosen to take a look at what the Bitcoin Blockchain has to offer instead of relying on old investment strategies, fading in efficiency.

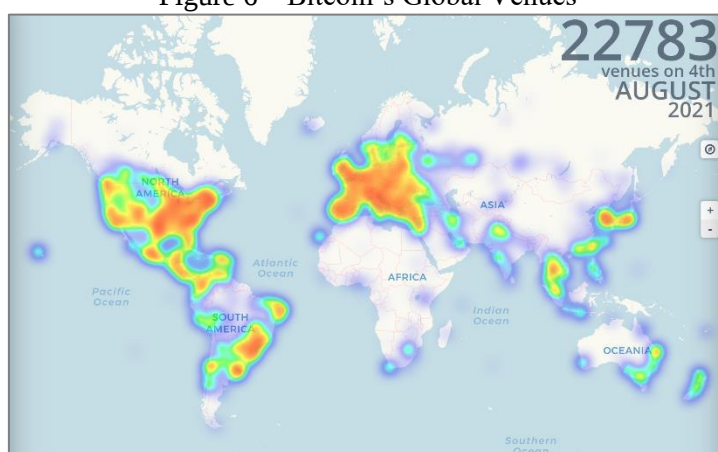
Numerous perceptions and opinions exist in the environment surrounding Bitcoin. From CEOs such as Michael Saylor or Ross Stevens who are all in on Bitcoin to investors such as Nassim Taleb, the author of the “*Bitcoin Black Paper*”, who, on the contrary, believe bitcoin is actually worth zero along with multiple different politicians, corporates, C level managers, bankers or even investors often changing their statements about Bitcoin on social platforms, it has become increasingly more difficult to know who to listen to given the complexity of this environment when asking ourselves this question for the first time.

### 5.1. The Bitcoin Standard Today

An important point to bring forward before diving deeper in this analysis is that the Bitcoin Standard is no longer theoretical. During the Bitcoin conference held in Miami in early June of 2021, Jack Maller, Founder and CEO of Strike, announced El Salvador’s bill to legalize bitcoin as legal tender. And on June 9, 2021 El Salvador was the very first country to make bitcoin a legal tender as congress had approved the bill by a supermajority of 62 votes out of 84 (President Bukele, 2021), meaning that bitcoin is now an accepted medium of exchange alongside the US dollar within the country. The instable economic situation El Salvador found itself in, having abandoned its currency (the “colon”) in 2001 and having to rely on remittances ever since (Adejunti, 2021) has triggered their move towards a Bitcoin Standard that has the potential to offer them economic stability and growth.

Additionally, Bitcoin has created a completely new economic environment that multiple industries are able to join and have since its inception in 2009. From geothermal industries for Bitcoin mining to media platforms and special banks and exchanges, such as Avanti bank or Kraken, dedicated towards crypto currencies, the network as already grown sufficiently for 246,380 transactions to be confirmed daily (Blockchain.com) and for 22,783 businesses to have already decided to accept bitcoin as payment around the world (Coinmap.org) on August 4th, 2021, distributed as such;

Figure 6 – Bitcoin’s Global Venues



Source: Coinmap.org (2021)

Nevertheless, while those numbers are surprisingly high for such a young technology, it is still a relatively small number on a global scale. Yet, with bitcoin having already reached a trillion-dollar market cap in February 2021 and sitting at a \$738 billion dollar market cap on August 5<sup>th</sup>, 2021 (Coinmarketcap.com), large enough that we should consider analyzing it.

## 5.2. Governments Adoption and Ban

In reference to our previous point, it is interesting to see that while many businesses, investors and tax payer (referred in this section as B.I.T.) seem to have already found ways and use cases to interact economically through the Bitcoin Blockchain, only one country has made bitcoin legal tender.

While an important question that arises is “*why Bitcoin out of the thousands of cryptocurrencies that exist?*” is due to the fact that only Bitcoin possesses the characteristic of being completely decentralized, another is “*why has only one country taken the decision of making bitcoin a legal tender?*”? We therefore intuitively understand that the incentives between governments and B.I.Ts are not aligned when it comes to the selection of a monetary standard to operate in. This is due to the difference in the degree of importance given to characteristics and properties

attributed to the money. The discrepancy between governments and B.I.Ts' incentives in money selection has created this gap in adoption and also perception of the Bitcoin Blockchain.

As B.I.Ts have all experienced the loss of purchasing power in one way or another, their incentive is to seek out the hardest form of money (when still being salable across scale and space) as expressed by this equation;

$$\text{Hardness of money} = \frac{\text{Current stock of monetary units (STOCK)}}{\text{New production of monetary units (FLOW)}}$$

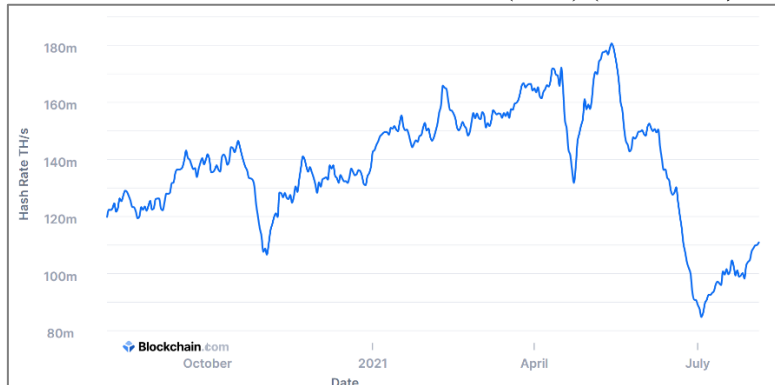
All in order to protect their hard-earned savings set aside for future consumption and purchasing power. While B.I.Ts seek to maximum salability across time, space and scale, making bitcoin highly interesting for them, those are not sufficient properties to be defined as “good money” for governments that are accustomed to function with money having special properties that allows them greater control over the market (Lewis, 2021).

While the adoption of Bitcoin was an opportunity for a struggling country like El Salvador and enabled it to regain a form of economic independence, bringing financial inclusion, investment, tourism, and help develop the country (President Bukele, 2021), other governments have a very different opinion of the Bitcoin Blockchain.

Over the years, many major worldwide governments, such as the US, China or even India for instance, have shown their distrust of the Bitcoin Blockchain and have attempted on multiple occasion to stop the adoption rate from growing and with very different strategies.

China can probably be described as the number nation against Bitcoin as it has been cracking down on Bitcoin for multiple years now. In China's perception, Bitcoin, as well as all other crypto-currencies, are a threat as mentioned in their recent statement; *“Recently, crypto currency prices have skyrocketed and plummeted, and speculative trading of cryptocurrency has rebounded, seriously infringing on the safety of people's property and disrupting the normal economic and financial order.”* (Reuters, 2021). As seen on Figure 6, no Bitcoin venues are available in China. The country has repeatedly banned services related to the crypto currency; banning crypto-currency trading in 2019 (Cellan-Jones, 2021), banning financial institutions and payment companies providing crypto transaction services (Reuters, 2021) and driving all Bitcoin miners out of the country causing a drop in the hashing rate of the network in June 2021 and a drop in Bitcoin's price (i.e., value) until the miners have been able to relocate elsewhere and start mining once again.

Table 17 – Bitcoin’s Total Hash Rate (TH/s) (2020-2021)



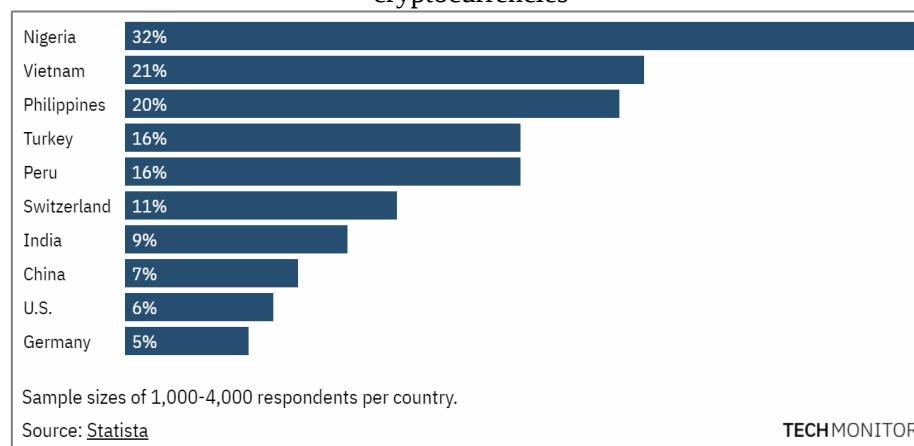
Source: blockchain.com (2021)

Many other governments have taken a stance against Bitcoin, banning crypto-currencies or severely restricting services and usage, such as Nigeria, Turkey, Ghana, Bolivia, Nepal, Algeria, Vietnam, India or even Egypt (Noone, 2021). For governments, cryptocurrencies represent major threats if they show to be too successful among citizens. People and companies fearing that governments will ban Bitcoin have precedent, the executive order 6102 (see Part I, section 2.2.3.) is a perfect example of governments banning the ownership of an asset that might compete with the US Dollar.

Chief Market Analyst, Neil Wilson, of markets.com said *“Other countries might follow as central banks make strides towards their own digital currencies. Governments don't like other people creating money - they've seemed to tolerate crypto-currencies for some time, but they will eventually get their own digital currencies established and will squeeze Bitcoin out into the margins.”* also adding *“Although bitcoins appreciated massively, it's far too volatile to be a currency”*.

Because governments will lose their powers in the bitcoin standard, regulatory attacks will probably never stop. What is interesting to see is that cryptocurrencies tend to be at their most popular in countries having taken a stance against it. Ultimately, any attempts to ban or restrict Bitcoin are effective marketing tool for the network. As Bitcoin was created to exist beyond the state, banning attempts actually reinforces the reason of its existence and the citizens belief in it as well.

Table 18 – Online survey asking respondents in selected countries if they used or owned cryptocurrencies



Source: Statista (2021)

While Western economies and regulators haven't initiated any steps regarding the ban of crypto-currencies, their attitudes have grown notably hostile. The Former US President, Donald Trump, expressed his concern and disregard for Bitcoin following the El Salvador news on June 8<sup>th</sup>, *"I don't like it because it's another currency competing against the dollar"* before adding that he wants to see the US dollar as the currency of the world (Russon, 2021). ECB President, Christine Lagarde, has condemned bitcoin as being highly speculative and heavily associated with money laundering. Meanwhile, US treasury secretary, Janet Yellen, held a similar speech, picturing bitcoin as mainly for illicit financing.

However, within these same governments, some politicians are starting to show favorable views on Bitcoin and Blockchain with a nuanced approach. SEC Commissioner, Gary Gensler, referred to crypto-currencies and blockchain as "innovative irritants" as well as a "catalyst for change", recommending that the FED moves into the modern digital era as well as bringing digital currencies under SEC regulation, *"A new form of money has come along, and we need to make sure that we are achieving public policy goals with the new form of money"* (Sharma, 2021). Jerome Powell, US FED Chairman, talk on bitcoin and referred to it as "digital gold"; *"As digital gold, bitcoin has monetary value. In our view, the discussion about bitcoin's lack of intrinsic value is mostly irrelevant. As with diamonds, art, stamps, gold and the US dollar, bitcoin does not provide cash flows. Yet, all these asset classes have monetary value, and most of them are considered to be a store of value."* (Blokland, 2021). The IRS even sees it as a commodity for tax purposes.

All these legal and regulatory attacks launched against the Bitcoin Blockchain, and all other crypto-currencies, by governments allows us to understand that they have decided against its system, viewing it as a threat to their power already emplaced through the fiat system currently

in use. As investor Ray Dalio explained; *“Every country treasures its monopoly on controlling the supply and demand of currencies. They do not want other monies to be operating or competing”*.

It isn't surprising that governments have begun to move against Bitcoin and cryptocurrencies as a whole. While their intention of limiting the numbers of scams due to the rising number of Alt-coins<sup>34</sup> scams, forecasted to increase by 75% in 2021 after a 40% increase in 2020 (O'Brien, 2021), the reality of the bitcoin system is such that a study back in 2018 actually showed that less than 1% of bitcoin transactions are illicit (Coincenter, 2018). Through the nodes in the system, the network is perfectly capable of auditing addresses on the blockchain. The KYC processes in place in major exchange also enables authorities to track some accounts if there are reasonable doubts on a certain wallet.

Banning or restricting mining and usage of other crypto-currencies is to everyone's benefit when attempting to reduce the number of scams. With Bitcoin being as successful as it is, and its code being open sourced, many are trying to build a “better” version based on the first code. This leads to massive inflows of new coins in the market

However, the most important reason why governments are attempting to ban cryptocurrencies is because of the threat it poses to government. Bitcoin's decentralized nature undermines the central bank's ability to fix problems underlying the currencies depreciations as well as diminishes their influences within their jurisdiction over investment, spending or inflation (O'Brien, 2021). As bitcoin uses encryption, it is not able to be confiscated as easily as any fiat currencies. Governments can always attempt to ban it, but with Bitcoin reaching a market capitalization of over \$1 trillion, it's becoming increasingly more complicated to do so as many companies have exposure to bitcoin (MicroStrategy, Square, Tesla, BMW...). Also, federally regulated U.S. banks have the ability to custody crypto assets, sometimes under bailment laws such as in Wyoming with Kraken or Avanti Bank. This makes any attempt of banning bitcoin an attack on the balance sheet of many corporations, funds, banks and others... such a decision would not be received well by millions of voters that owns bitcoin.

Bitcoin has been described by some as money over internet protocol or MOIP<sup>35</sup>, because it relies heavily on the internet to operate. Because of that, the destruction or failure of the internet is a risk factor. The very nature of the Bitcoin system being a decentralized, transparent, open-

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<sup>34</sup> Term used to refer to an alternative coin to bitcoin.

<sup>35</sup> Money Over Internet Protocol

sourced, voluntary, borderless system operating on the borderless medium that is the Internet, makes any ban difficult to enforce without controlling the population through the Internet (Edin and Milo, 2021). Banning Bitcoin would actually require preventing an open-sourced software to run on the web which, even taking constitutional laws aside, would be technically unfeasible. Moreover, it is technically feasible, if cumbersome, to send bitcoin transactions over two wave radios which is something the fiat monetary system is incapable of matching.

Additionally, heavy regulation in any jurisdiction would only benefit a competing one, less restrictive, as expressed below;

Figure 7 – Government's Banning Bitcoin

|                                           | Country B<br>Bans Bitcoin<br>(cooperates)                                                                  | Country B<br>Accepts Bitcoin<br>(defects)                                              |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Country A<br>Bans Bitcoin<br>(cooperates) | <u>Bitcoin wins</u><br>Ban fails, bitcoin adoption accelerates<br>Fiat currencies deteriorate more rapidly | <u>Bitcoin wins</u><br>Capital outflows from Country A<br>Capital inflows to Country B |
| Country A<br>Accepts Bitcoin<br>(defects) | <u>Bitcoin wins</u><br>Capital outflows from Country B<br>Capital inflows to Country A                     | <u>Bitcoin wins</u><br>Everyone wins<br>Benefits from trade & specialization           |

Source: *Unchained Capital* (2021)

### 5.3. Businesses, Investors and Taxpayers Incentives and Perceptions

While it is clear that major governments view Bitcoin as a threat, B.I.Ts having experienced at some point in their lives the loss of their purchasing power, continuously seek out to maximize salability across time, space and scale (i.e., the hardest form of money) along with strategies to protect their savings from governments debasement.

With the monetary supply increasing freely under the will of a privileged few, the overall value of the currency decreases at their whim. This leaves almost all B.I.Ts poorer. Every dollar printed as a negative effect on purchasing power. Certain fiat currencies like the US dollar have always done better than others. Fiat currencies compete for dominance based on how fast one is debasing compared to the other. While strong economies, such as the US or the EU, maintain value longer than others, it's not without limit. The debasement of the money supply impacts the wealth of all actors participating in trades in the debased currency. Only political constraint prevents fiat currencies from inflating. What has preserved our currencies in Western economies to inflate like the Venezuelan Bolivar is the relative discipline our governments have not to inflate our monetary supply to much in a short amount of time (Ammous, 2018).

As QE is the policy solution worldwide with all fiat currencies, holding value in the form of debt-based fiat is ultimately a risk that cannot be overstated for the majority of B.I.Ts. Their strategies to retain value vary from a wide range of option from real estate investment, creating different types of portfolios based on their private wealth, hedging with the purchase of physical gold or even acquiring collectibles and art pieces for instance, all in order to prevent too big of a loss in value over time.

The common denominator of all those strategies is that the system the B.I.Ts operate in remains the fiat system while Bitcoin could possibly provide citizens with a useful hedge against the debasement of national currencies as a whole. An alternative to the fiat system never truly existed before Bitcoin. Before bitcoin it was believed there was no alternative. The “only” response available was trusting the government to handle the situation in the event that a negative event would occur.

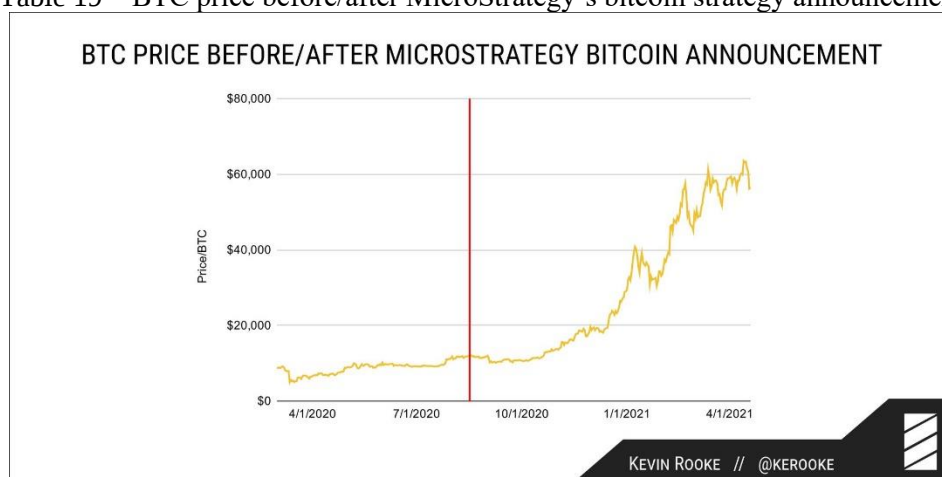
With the B.I.Ts trust in governments monetary policies fading every year, Bitcoin’s properties and decentralized system became highly appealing. This triggered many companies, institutions and people to analyze their finances through a new lens, moving from debt-based forms of money (i.e., fiat) to an asset-based form of money (i.e., bitcoin). This enabled leading companies such as MicroStrategy, Square and Tesla to put Bitcoin on their balance sheet, a financial innovation that wasn’t feasible until 2020. These companies have pioneered that decision in the last year (Pompliano, 2021)

The innovation here is bitcoin’s finite scarcity, solving the sound money equation (Lewis, 2021). Everything before Bitcoin was “relatively” scarce, bitcoin perfects that and obsoletes all other form of money in this aspect.

Eleven years after the creation of the Bitcoin Blockchain, in 2020, MicroStrategy’s CEO, Michael Saylor, made history as the very first publicly traded company’s CEO to have made a significant investment of treasury assets into bitcoin. It all started on August 11<sup>th</sup>, 2020, when he announced his firm was making a long-term investment of \$250 million in bitcoin (Jakobson, 2021). Michael Saylor described bitcoin as a dependable store of value and an attractive investment compared to the dollar that he described as melting ice cubes, words that resonated with Wall Street at the time as the US Treasury was printing trillions of dollars for Covid-related spending, inflating the money supply. Following that investment, MicroStrategy doubled down and has kept investing in bitcoin ever since, reaching a total of approximately 105,085 BTC held by the company as of June 2021 (Stankiewicz, 2021).

In early February, MicroStrategy held a private keynote event named “Bitcoin for Corporations” which over 10,000 corporates attended per day, many more than what was forecasted, ultimately breaking their video server (Shapiro, 2021). Following that event, Michael Saylor even released a “*Bitcoin Corporate Playbook – Open-source Documents*” to help corporates navigate a bitcoin strategy. MicroStrategy’s decision to invest in bitcoin paved the way for other institutions to consider adding bitcoin to their balance sheet. Co-founder of crypto custodian Anchorage, Diogo Mónica, has explained that 2021 is seeing an avalanche of institutions shifting from considering bitcoin towards asking for specific forms of participation and services.

Table 19 – BTC price before/after MicroStrategy’s bitcoin strategy announcement



Source: KevinRooke.blog (2021)

With as many bitcoin venues as reported (see Figure 6, section 5.1.) it is safe to say that many have followed the same path as Michael Saylor and MicroStrategy have, joining the Bitcoin network either by investing in it or accepting it as a payment option.

Tesla is the second largest publicly traded company to have invested heavily in bitcoin. This investment followed a casual twitter exchange between Tesla CEO Elon Musk and Michael Saylor where MicroStrategy’s Michael Saylor suggested that Elon Musk should do Tesla’s shareholders a \$100 billion favor by converting its balance sheet from USD to bitcoin. A couple of months later, Elon Musk announced that he had purchased \$1.5billion worth of bitcoin using the cash sitting on Tesla’s balance sheet (Shapiro, 2021). As companies are very careful about their reserves, Tesla’s move was perceived as a signal that they expect that bitcoin will emerge as a stronger store of value than gold or the US dollar. President and chief investment officer of Tanaka Capital Management in New York, Graham Tanaka, said that this move from Tesla may be a fundamental game changer in the perception companies have on bitcoin (Kumar, 2021)

Twitter's CEO Jack Dorsey has also been a bitcoin advocate for years now and has recently made headlines as he confirmed to investors that bitcoin will be a big part of Twitter's future. He sees an opportunity to integrate bitcoin into existing products and services available on Twitter. Additionally, Dorsey recently launched a bitcoin fund with the American rapper and businessman Jay Z after acquiring a majority stake in Jay-Z's TIDAL music service as he also believes that bitcoin could change the music business (Perez, 2021). Dorsey believes that bitcoin could help his companies move faster in terms of product expansion and is the best candidate to become the internet's native currency. He also added *"I think this is a big part of our future. I think there is a lot of innovation above just currency to be had, especially as we think about decentralizing social media more and providing more economic incentive. So, I think it's hugely important to Twitter and to Twitter shareholders that we continue to look at the space and invest aggressively in it"*.

Other big companies have made headlines recently and Amazon appears to be the next big company to enter the Bitcoin network as they have published job vacancies for digital currency and blockchain experts in July 2021 (Pompliano, 2021). When asked about this recent desire to hire blockchain experts, an Amazon spokesperson commented: *"We're inspired by the innovation happening in the cryptocurrency space and are exploring what this could look like on Amazon. We believe the future will be built on new technologies that enable modern, fast, and inexpensive payments, and hope to bring that future to Amazon customers as soon as possible."* While Amazon's exact plans are still unknown, the decision to hire such experts is an acknowledgment of bitcoin's potential and the opportunity its network brings.

Many other companies have joined the network including Square, Microsoft, Visa, Mastercard, AT&T, BMW, Twitch and even NBA basketball team; the Dallas Mavericks to only name a few of the 22,000 plus companies that accept bitcoin as payment or have it on their balance sheet (Coinmap.org).

Banks and funds have also heavily invested in this Bitcoin network. As recently as August 5<sup>th</sup>, 2021, the banking giant JP Morgan Chase has announced partnering with New-York Digital Investment Group in order to soon provide a passively managed bitcoin fund to clients. While wealthy clients were already capable of acquiring an exposure to bitcoin through other funds available in brokerage accounts, this new fund is said to be available for all, and only, JPMorgan Private Bank clients and will be presented to them as *"the safest and cheapest bitcoin investment vehicle available on the private markets."* (McShane, 2021). JPMorgan Chase is only one bank out of many who has opened up to bitcoin. A few others worthy of mentioning

are; Goldman Sachs, Wirex, USAA or the National Bank of Canada, all allowing customers to use Bitcoin or other cryptocurrencies.

During an interview on Bloomberg, Michael Saylor stated *“In an expansionary, monetary environment, you want scarce assets. The scarcest asset in the world is Bitcoin. It’s digital gold. Gold will lose out to Bitcoin in reallocations. If we bought gold instead of Bitcoin, we would be down \$2 billion. It would have been a disaster. Once people start thinking about what they want, which is a non-sovereign, safe-haven store of value, they’re going to realize that Bitcoin does the job of gold better, and you’re seeing all of the institutional flows move out of gold into Bitcoin.”*

Given this global adoption and following the idea of SEC Commissioner, Gary Gensler, either bitcoin will eventually ultimately replace fiat currencies in a free markets between participants other than the government, or the competition it provides will enforce greater standards, limiting the governments capacity to cause harm to B.I.Ts through governmental monetary policies (Edin & Milo, 2018).

Governments, powerless to print or debase bitcoin, are witnessing Bitcoin’s rise as a mode of escaping fiat systems. The more people use Bitcoin to store their wealth and trade, the more the governments monopoly of money is eroded. The more its power within a society is curtailed and the more its capacity to cause harm through the abuse of fiat policies is limited (Edin & Milo, 2018).

Nevertheless, while the adoption of Bitcoin amongst B.I.Ts keeps increasing, some remain skeptical on its true value. Many, other than the governments, still strongly believe that while Bitcoin does represent a potential threat of destabilizing currencies and cause harm to our current economic system because of the way it has skyrocketed, the system doesn’t have any sound financial strength (Urquhart-Stewart, 2021). co-founder of Seven Investment Management and the Regionally investment platform, Justin Urquhart-Stewart, went on to say that *“Bitcoin is dangerous because it's trying to create a level of credibility to unreliable and wholly unfounded value.”* While senior market analyst, Jeffrey Halley, told Bloomberg *“The crypto craze is entirely driven by short-term speculative momentum and mania.”*

Jeffrey Halley and Urquhart-Stewart’s statements on bitcoin are echoed by many others including former risk analyst and trader, Nassim Taleb, author of the Bitcoin Black Paper.

In his paper, Nassim Taleb explains that, in spite of the hype surrounding this space, he believes bitcoin has failed to satisfy the notion of “currency without government” additionally of not being a short- or long-term store of value due to its overwhelming volatility. He argues that bitcoin’s expected value is no higher than 0, making it an unreliable hedge against inflation. And when compared to gold, Taleb believes the comparison lacks in financial rigor as *“Gold and other precious metals are largely maintenance free, do not degrade over an historical horizon, and do not require maintenance to refresh their physical properties over time. Cryptocurrencies require a sustained amount of interest in them.”*

As bitcoin’s average realized annualized volatility hits a staggering 114%, ten times gold’s volatility (Blokland, 2021), many share the idea that bitcoin’s volatility is too extreme to be compared to gold as a store of value. Some are making the case that it is too volatile to be even considered a currency in places such as El Salvador (Wilson, 2021).

While Bitcoin is promoted as a store of value and medium of exchange, its price is very volatile, thus leading to beliefs that it isn’t such a good store of value after all. This is probably Bitcoin’s weakest point. With people having yet to understand Bitcoin, its price volatility isn’t surprising as sentiment dictates whether investors buy or sell. This can be dangerous in the short-term for people looking to make a quick buck (Lewis, 2021).

It’s also relevant to mention that, as time goes on, Bitcoin’s volatility is decreasing. Nonetheless, due to this volatility, Bitcoin isn’t the asset for an emergency fund or a down payment in the near term.

If Bitcoin keeps growing as it does however, it is very likely that its volatility will keep decreasing until it ultimately reaches an acceptable level. Having exposure to Bitcoin is making the bet that the network effect (i.e., worldwide adoption curve) will keep increasing as well as its value and its volatility lowering (Lewis, 2021).

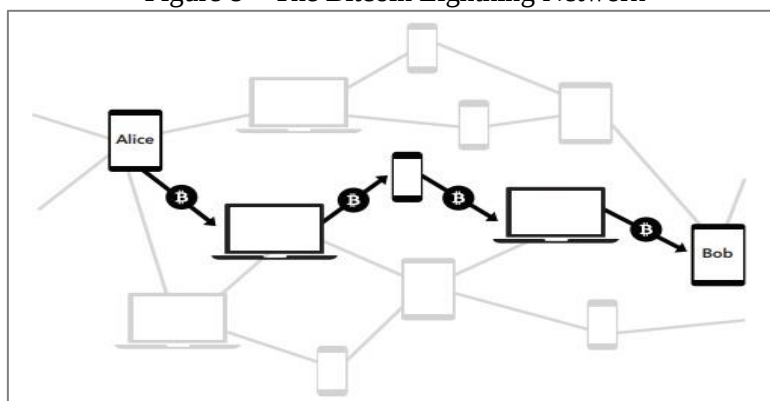
As Bitcoin is ultimately technology, Taleb’s paper also underlines the threat that characteristic actually represents as technologies tend to be supplanted by newer technologies over time, making the argument that gold is a safer option as it has proved resistant to extinction (Taleb, 2021). Bitcoin integrates several kinds of technology in a unique way that make it the world’s most innovative form of money and some consider it an entirely new asset class. However, no technological breakthrough lasts forever and it is possible that something better comes along which makes it obsolete. Some commentators believe the SHA 256 algorithm could someday be rendered obsolete by quantum computing. That being said, the incentives for mining are

such that it's more likely a person or entity would use this computing power to mine bitcoin rather than attack it.

The advantage behind Bitcoin being technology, and therefore upgradable money, is that, while some criticism of the Bitcoin Blockchain had value in the past, it being technology has allowed the protocol to get better. This has never been possible with previous forms of money such as gold and fiat currencies for instance. This enabled Bitcoin to offset most criticism over the years. While the idea that something newer and better comes along is still relevant as we are talking on technological advancement but it is much less likely to occur given Bitcoin properties (Edin & Milo, 2018).

To provide proof of this upgradability, the Bitcoin network is soon to release upgrades on the network with the Lightning Network powered by blockchain smart contracts to enable instant, high volume and low-cost payment across the network, solving the transaction time issue often brought forward in Bitcoin's critics and without the risks of having to trust third parties for custody (lightning.network, 2021).

Figure 8 – The Bitcoin Lightning Network



Source: lightning.network (2021)

Bitcoin often receives criticism about the number of transactions the network can handle per second when compared to companies like Visa and Mastercard. Its low number of transactions makes people worry about its scalability and therefore its future as a potential currency. This issue actually played a key role in the 2017 fork between Bitcoin and Bitcoin Cash where the block size was modified to process more transactions.

But there is always a trade-off between security, speed and decentralization for payment systems, bitcoin happens to have chosen to maximize security and decentralization. By keeping the size of the block small, bitcoin allows anyone to participate and run their own node without requiring massive equipment's to verify the blockchain. The best way to view it is to see Bitcoin

as a settlement layer, making any comparison with Visa inappropriate as Visa itself sits on top of settlements layers in the banking system (i.e., the fiat system). In fact, similar to the banking system, Bitcoin actually has a second layer protocol that increases transactions per second on the Lightning Network, which increases its scalability.

Another soon to be released upgrade is Taproot, one of the most anticipated technological upgrades of the system that will modify the way Bitcoin's scripts operate to improve security, scalability and privacy across the network (Binance, 2021). These didn't exist back in 2009 but do now, improving on the original protocol and reducing the level of risks of the Bitcoin Network as a whole.

Many have also expressed environmental concerns about the Bitcoin Blockchain that is currently under exam and the question about its energy usage (energy it uses to secure the Bitcoin network) is in the news.

With the Bitcoin network currently using more energy than small countries, and the network continuously growing in size, environmental concerns grow accordingly. And because of its decentralization, its electricity consumption is hard to estimate with precision (Blokland, 2021). In our world, continuously growing toward sustainability, environmental risks are a concern for everyone.

That being said, by approaching Bitcoin's electricity consumption, the same way we do for other application such as travelling, we understand that its consumption is actually only driven by the demand for its secure network. The growing consumption is truly an acknowledgement that Bitcoin has value.

Because electricity is the primary resource for the network's operations, participants (i.e., miners) are incentivized to access the cheapest possible source of energy available. This leads to them searching for green, renewable and stranded energy to lower their costs and improve their margins.

In effect, Bitcoin's miners actually seek cheap stranded energy that would otherwise be wasted, or flared into the atmosphere, into a monetary asset that preserves energy better than any other money in history. In fact, the network has estimated that the amount of renewable and stranded energy used to power the network is around 75%. And as the energy allow the protocol to run, one could make the argument that there could be no better use of energy than the one securing the integrity of a monetary system.

Meanwhile that same risk to the environment and energy posed in a fiat standard gets a free pass even though it is orders of magnitude worse for the environment and energy.

Fiat currencies are using energy and printing insane amounts of money while stealing the wealth of the many to benefit the few. Through this lens, we have to ask ourselves if the fiat system doesn't represent a greater risk to the environment? How does its energy usage and environmental impact compare to the Bitcoin Standard?

Additionally, when looking at the banking system broadly, it is an energy hog. The fiat standard also produces obscene levels of waste and misallocation of resources. One can make the argument that bitcoin network makes superior use of energy than the fiat system if compared side by side without bias. To an environmentalist, the fiat system represents a much greater risk to the planet than the Bitcoin system and that's before considering their ability to preserve economic value across time and space.

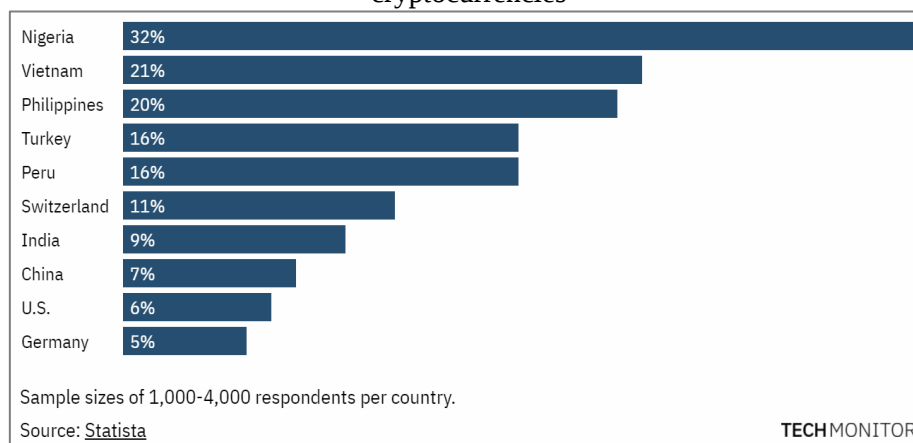
In fact, a recent study conducted in 2020 has put forward the global energy usage of banks. With the banking system requiring servers, multiple physical entities and ATMs to run properly, the yearly average electricity usage reaches a staggering 101.15 Twh (Corneillie, 2020). Meanwhile, that same year, the Bitcoin system required 75 Twh to run (Corneillie, 2020) and most of its energy usage is renewable and stranded energy.

#### 5.4. Bitcoin, Risk or Opportunity?

While El Salvador saw bitcoin as an opportunity to gain financial freedom from the US after having lost their currency and having to rely on the US dollar, the many legal actions struggling countries have taken to regulate or ban cryptocurrencies have made it clear that El Salvador situation is unique and that governments have decided that Bitcoin is a threat to their system, and rightfully so. Along with struggling governments such as Nigeria, Bolivia or Vietnam, strong nations such as China already share the belief that Bitcoin is a threat and have made crypto illegal as Bitcoin's system allows for the separation of money and state and therefore has the potential of disrupting the normal economic and financial order, threatening their money monopoly (Cellan-Jones, 2021). In fear of losing their power, along with growing concerns about taxation and their lack of control over bitcoin, other countries will soon follow as governments won't allow for another money and medium of exchange to be created. Many governments have already decided to follow a different strategy, additionally of taking legal actions, by creating their own digital currency and are looking to squeeze bitcoin out into the margins long term (Wilson, 2021).

Because western economies haven't inflated their currencies the same way other countries have, people living in these countries were less drawn to convert their money to bitcoin. Therefore, Bitcoin didn't appear to be an immediate threat to their system.

Table 20 – Online survey asking respondents in selected countries if they used or owned cryptocurrencies



Source: Statista (2021)

Nevertheless, the attitude of developed countries has grown more hostile these past few years, now viewing bitcoin as a potential threat to their system on the long run as well. Governments are now looking for ways to limit bitcoin's adoption. However, western governments having dismissed it for so long has enabled many citizens and businesses to enter this space and gain exposure to bitcoin without much difficulty. Additionally, with federally regulated U.S. banks having the ability to custody crypto assets, any new legal actions to attack the Bitcoin network in developed countries (mostly the US and EU) will ultimately translate into an attack on the balance sheet of many corporations, funds, banks and others... such a decision would not be received well by millions of voters that owns bitcoin (Saylor, 2021).

The Bitcoin Blockchain poses a real threat for governments looking to keep ruling with an iron first over their monopoly. Nevertheless, a threat for an organization could be an opportunity for another, which is exactly the situation Bitcoin has created. While governments are now fighting to fend off the risks Bitcoin poses to their system, many (but not all) businesses and individuals are seeing Bitcoin as an opportunity for the future.

From the outside looking in, it appears that answering the question of whether or not Bitcoin is an opportunity for companies and individuals is somewhat of a subjective matter given the actual state of the network and the opposition of perceptions individuals have on Bitcoin, still in a speculative phase being highly volatile and trying to figure out its total value and audience (Alden, 2021). With as many proponents and skeptics over the Bitcoin network, the knowledge

gap created by this newly engineered form of money has clearly made it difficult to understand the reality of the situation.

Bitcoin represents a response strategy to the fiat system that every company and individual should seek to exploit given the recent different economic and currency crisis around the world. There is a fiduciary responsibility on the part of 100% of companies and individuals to, at the very least, look at bitcoin and fully realize the risks and opportunities of both systems regardless of their position as proponents or skeptics of the Bitcoin Blockchain. They have the responsibility towards their shareholders or families to take an informed decision.

With major companies investing billions of dollars into bitcoin, such as MicroStrategy or Tesla, and given the growing number of companies working on accepting it as a medium of exchange, with already 22,783 businesses having decided to accept bitcoin as payment around the world on August 4th, 2021(Coinmap.org), we ought to ask ourselves “*what do they know that we don't?*”. the answer lies in the understanding of the Bitcoin protocol.

History has demonstrated that each emergent money eventually replaces the previous monetary system, when improving upon the pre-existing properties of any monetary good (see Part I, chapter I.). Essentially, the new money outcompetes the old money. Gresham’s Law says that bad money drives out good money meaning the average citizen will spend the “bad” money and hoard or save the “good” money.

While governments have fought for many years the creation of other medium of exchanges, Satoshi Nakamoto’s design of the bitcoin monetary system successfully offered us the freedom to choose our money, creating the monetary competition governments have always feared as they are unable to stop this system from running.

With the emergence of Bitcoin, everyone now has the responsibility to analyze both monetary systems in their role as stewards of money. This not only includes analyzing the risks and opportunities of this newly created monetary system but also putting our current system through a risk analysis lens. Before the bitcoin standard appeared, the systemic risks in our fiat standard were not well known nor were they critically analyzed. We simply trusted that our governments and central bankers knew what they were doing. This changes with Bitcoin. The Bitcoin network was architected with the failings of the fiat monetary system in mind (Saylor, 2020).

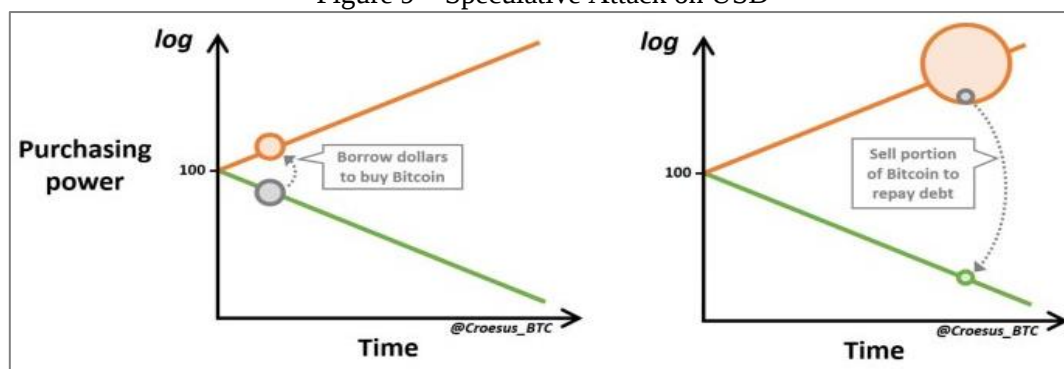
With bitcoin’s proof of work system, we optimize divisibility, portability, recognizability, durability and scarcity. It is a sound money alternative being offered to the world, that holds

governments accountable for their monopoly on money. Its system treats everyone fairly, it offers no special treatments whether you're a billionaire or a farmer.

Today, we're in the early stages of this transition from fiat to bitcoin. We are already witnessing a rapid loss of confidence in the world's reserve currency (the US Dollar) from Fortune 500 companies, such as MicroStrategy and Tesla. We're seeing insurance companies, hedge funds, sovereign wealth funds, family offices and major Wall Street banks all gain exposure to bitcoin because of the macro environment caused by fiat currency and continuous QE.

One notable example is CEO Michael Saylor, who persuaded his board to designate bitcoin as MicroStrategy's primary reserve asset in August 2020. Saylor is a tech savvy rocket scientist who conducted an extensive investigation into the risks of bitcoin protocol after seeing the US government and central bank increase the M2 money supply by 15-20% in the spring of 2020 (see Table 8). He realized that the US dollar is a debt-based instrument that was rapidly losing purchasing power while bitcoin is an asset that has increased in value every year. As companies are careful with their reserves, he and his board conducted a thorough risk assessment and concluded that bitcoin was less risky than holding US dollars.

Figure 9 – Speculative Attack on USD



Source: Bitcoin Insider (2021)

By putting bitcoins on his balance sheet, CEO Michael Saylor understood the underlying opportunity of using this Blockchain and effectively hedged against the systemic risk of the US dollar. He and his board viewed the US dollar on their balance sheet as melting ice cubes. This strategy not only works for businesses but for those individuals ready to do their homework and assess the system. As more companies around the globe learn about MicroStrategy's moves and do their own risk assessment, many are likely to soon follow their lead while governments will follow the opposite path as mentioned earlier.

Today, at only twelve years old, Bitcoin is still a new asset class and store of value. Given current adoption rates, bitcoin's value will continue its upward trajectory because of network

effects and its limited supply. While volatility during this adoption phase is unavoidable, it will naturally decline when adoption stabilizes. The adoption curve of bitcoin is even greater in those countries who have collapsing currencies due to hyperinflation or double-digit inflation. For them, bitcoin is a monetary lifeboat (Breedlove, 2020). Bitcoin also is designed so that anyone with a cell phone can use it as a store of value and have access to financial services, even the unbanked.

Given Bitcoin's young age and its system not being ready to be a worldwide unique currency yet, the best possible strategy on a short-term spectrum would be managing the risks by taking an appropriate position size in both system's depending on our financial situation and our horizon. Ultimately, the fiat system will breakdown due to the erosion of trust people have in the system. Because trust doesn't have a numerical value, it is hard to determine when the erosion of trust will be sufficient for people to have to look into bitcoin.

While it's not yet the world's reserve currency, there are many who believe it will become so in the next 10-20 years. There is no doubt the world desperately needs a borderless, digital transactional currency, that operates without needing third parties to promote trade. Having a digital currency native to the internet brings international markets closer together by separating money from state control. More companies, sovereign wealth funds, global banks and individuals see this new monetary system as vastly superior to government money.

Because of bitcoin's finite scarcity (its supply being capped at 21 million coins), it obsoletes all other forms of money in salability across time (Lewis, 2021). Its scalability, security and improving transferability is slowly transforming it into the ultimate form of money the free market was always searching for. It is one step closer towards Von Mises idea of keeping the money under the control of the owner, rather than the state, creating an environment where governments are having to be fiscally responsible and create value on the market in order to stay relevant and in business (Ammous, 2018)

Bitcoin is an opportunity for any company or individual and is offering a perfectly safe, resistant, maintenance free store of value that fiat currencies can no longer provide. All participants of the network should look to allocate all extra fiat currencies they possess and don't require for short-term expenses and transfer them into bitcoin for future consumption (McCormack, 2021).

Bitcoin is the only trillion-dollar monetary system in the world running 24/7/365 making it highly liquid. Its permissionless system delivers orders of magnitude improvement over the fiat permissioned based, multi-layer, business hours only, monopoly driven financial system.

Governments and central banks responded to the Covid crisis with the same tools they used during the 2008 crisis. Fortunately, Satoshi Nakamoto in his white paper offered us a choice that appeared in 2008 during the height of that last financial crisis. Continue to use a centrally planned, government-controlled currency that continuously loses value through time or a decentralized trustless digital currency with fixed supply offering economic stability.

Bitcoin's innovation is a far superior form of money in our digital age.

Figure 10 – Bitcoin vs Fiat

|                        |  |   |  |
|------------------------|-----------------------------------------------------------------------------------|---|-------------------------------------------------------------------------------------|
| <i>Supply</i>          | Fixed Supply:<br>21 million                                                       | > | Limitless:<br>QE                                                                    |
| <i>Supply Schedule</i> | Fixed schedule:<br>10 minute intervals                                            | > | Unpredictable:<br>QE / Reverse QE                                                   |
| <i>Governance</i>      | Consensus                                                                         | > | Central Bank                                                                        |

Source: nakamotoinstitute (2020)

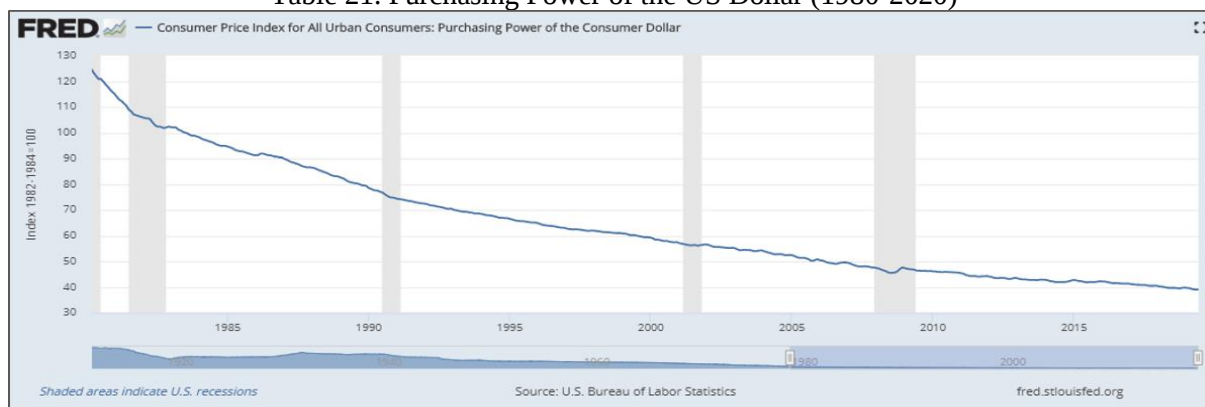
Because bitcoin shares and improves upon the monetary properties of gold, and shows us the inevitable loss of value in fiat currencies, markets will eventually move towards a bitcoin standard.

However, the strongest fiat currencies like the US dollar and the Euro will never disappear completely. Fiat currencies will coexist with bitcoin as governments will keep enforcing the use of their currencies for tax purposes and to maintain their power regardless of the adoption and attention the Bitcoin network gets. Nonetheless, the free market will ultimately determine the soundest form of money in the 21<sup>st</sup> century, not governments. Bitcoin offers everyone on the planet an opportunity and an alternative asset for storing their wealth that holds its value over time, controlled by the owner and not the government.

Government's currently have the monopoly power to create money and make us use it even when they debase our savings and purchasing power. However, they can't make us value it. The rapid loss of confidence in the world's reserve currency, the US dollar, has led Fortune 500 companies like MicroStrategy and Tesla to seek out better, sounder forms of money to hold on

their balance sheet. We don't need to suffer the same fate as the Venezuelan bolivar to recognize that the fiat system is currently flawed.

Table 21. Purchasing Power of the US Dollar (1980-2020)



Source: U.S. Bureau of Labor Statistics (2021)

Ironically, the speed at which governments have debased their currencies is directly linked to the speed of adoption for bitcoin. Based on events brought forward in this paper and regardless of current flaws in the system, I believe adoption will happen and Bitcoin will become the base layer to a new global monetary system.

## Conclusion

The introduction of a new monetary system for the digital age does bring forward new kinds of risks and opportunities for all businesses and individuals.

This thesis had for objective to answer the question of whether or not the Bitcoin Blockchain represented an opportunity for our current monetary system governed by superior authorities, essentially the government and central bankers, called the fiat standard.

In order to determine if the Bitcoin Blockchain represented an opportunity or a threat, and to provide as complete an answer as possible, we first worked on defining money as well as monetary standards. Our following step was to present our current system (i.e., the fiat standard) in order to understand monetary evolution as well as the innerworkings and the unresolved issues deeply rooted within the current system, making this thesis relevant.

Our understanding of money, monetary standards and the fiat standard enabled us to then analyze the Bitcoin Blockchain and its protocol to understand the innerworkings of this newly engineered technological innovation allowing us to compare both systems efficiently.

With sufficient knowledge of both systems, we worked on understanding if Bitcoin was an opportunity or a threat by analyzing the current state of the market, the different perceptions institutions and individuals have of the Bitcoin Blockchain and the relevancy of their arguments as well as matching properties of both systems together.

Conclusively, we were able to identify that while a vast majority of governments are opposed to the Bitcoin Blockchain and perceive it not as an opportunity but as a threat to the current economic system, Bitcoin has had the opposite effect on companies and individuals as seen through the adoption rate of the system as well as bitcoin's value and total market cap, reaching a market capitalization of a \$1 trillion on February 19th, 2021 (Reuters, 2021).

It is clear that some government see the bitcoin standard as a more immediate threat than others. Regardless, governments in general, even if some politics give nuanced answer to the problem bitcoin poses (such as SEC Commissioner, Gary Gensler, or US FED Chairman, Jerome Powell), are rightfully viewing bitcoin as a threat to their power. Through a governmental perspective El Salvador is the exception that proves the rule as they undoubtedly perceive bitcoin as a threat given that its system was originally created to take the money market out of the hand of the governments and into the hands of the money owners and holders (Hulsmann, 2008).

On the other hand, for businesses and individuals, Bitcoin might be the greatest economic opportunity of the 21<sup>st</sup> century as no better version of this unique system is likely to be discovered or created given the protocol's properties (i.e., upgradable money) and the government's intention not to allow the creation of other mediums of exchanges that could threaten their monopoly.

The Bitcoin Blockchain allow businesses and individuals to have access to the hardest form of money ever known by mankind. Bitcoin's finite scarcity allows them to develop longer time horizons, having the ability to store their wealth and energy for the future and protect themselves against the stealth taxes of continuous QE.

Bitcoin matches perfectly with Hayek's idea that *"we shall never have a good money again before we take the things out of the hands of governments, that is, we can't take it violently out of the hands of governments, all we can do is by some sly roundabout way introduce something that they can't stop."* And many businesses and individuals have already seized this opportunity, MicroStrategy leading the way with over 100,000 bitcoins on their balances sheet.

While this analysis has enabled us to answer our question "Is the Bitcoin Standard an opportunity?", it is important to underline the limits of such an analysis.

Because of Bitcoin's young age and it being a technological innovation, we must concede the possibilities that there are other threats that can arise in the future. Threats that we don't have the knowledge to know about today (i.e., Unknown unknowns).

No one can predict the future with certainty. With this in mind, regardless of the fact that the market (businesses and individuals) appears to have adopted bitcoin as the future reserve currency, no one can tell if the adoption rate will be sufficient for bitcoin to overtake currencies such as the US dollar or the euro.

Also, the economic instability created by the Covid pandemic has made any economic predictions hard to assess due to the unresolved issues of the pandemic that is still far from over today. This creates a highly volatile economic environment for struggling currencies and even on the stock market due to repeated lockdowns.

Additionally, we mustn't forget that all analysis possesses a human judgment bias that is important to mention.

While we have been able to reach our objective by answering whether or not the Bitcoin Blockchain is an opportunity, many questions still remain and some even arise from our

conclusion. “How can governments alleviate the threat that is the Bitcoin Blockchain to their fiat system?”, “Can bitcoin and fiat currencies truly coexist or will one ultimately overtake the other completely?”, “How will national and international markets operate under a sound monetary system like the Bitcoin standard?” are just a few questions that ultimately will require an answer to.

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## Appendix

### Appendix 1. Executive Order 6102

POSTMASTER: PLEASE POST IN A CONSPICUOUS PLACE.—JAMES A. FARLEY, Postmaster General

# UNDER EXECUTIVE ORDER OF THE PRESIDENT

Issued April 5, 1933

all persons are required to deliver

## ON OR BEFORE MAY 1, 1933

all GOLD COIN, GOLD BULLION, AND  
GOLD CERTIFICATES now owned by them to  
a Federal Reserve Bank, branch or agency, or to  
any member bank of the Federal Reserve System.

### Executive Order

FORBIDDING THE HOARDING OF GOLD COIN, GOLD BULLION  
AND GOLD CERTIFICATES.

By virtue of the authority vested in me by Section 5(b) of the Act of October 6, 1917, as amended by Section 2 of the Act of March 9, 1933, entitled "An Act to provide relief in the existing national emergency in banking, and for other purposes", in which said Act Congress declared that a serious emergency exists, I, Franklin D. Roosevelt, President of the United States of America, do declare that said national emergency still continues to exist and pursuant to said section do hereby prohibit the hoarding of gold coin, gold bullion, and gold certificates within the continental United States by individuals, partnerships, associations and corporations and hereby prescribe the following regulations for carrying out the purposes of this order:

Section 1. For the purposes of this regulation, the term "hoarding" means the withdrawal and withholding of gold coin, gold bullion or gold certificates from the recognized and customary channels of trade. The term "person" means any individual, partnership, association or corporation.

Section 2. All persons are hereby required to deliver on or before May 1, 1933, to a Federal Reserve Bank or a branch or agency thereof or to any member bank of the Federal Reserve System all gold coin, gold bullion and gold certificates now owned by them or coming into their ownership on or before April 28, 1933, except the following:

(a) Such amount of gold as may be required for legitimate and customary use in industry, profession or art within a reasonable time, including gold prior to refining and stocks of gold in reasonable amounts for the usual trade requirements of owners mining and refining such gold.

(b) Gold coin and gold certificates in an amount not exceeding in the aggregate \$100.00 belonging to any one person; and gold coins having a recognized special value to collectors of rare and unusual coins.

(c) Gold coin and bullion earmarked or held in trust for a recognized foreign government or foreign central bank or the Bank for International Settlements.

(d) Gold coin and bullion licensed for other proper transactions (not involving hoarding) including gold coin and bullion imported for reexport or held pending action on application for export license.

Section 3. Until otherwise ordered any person becoming the owner of any gold coin, gold bullion, or gold certificates after April 28, 1933, shall, within three days after receipt thereof, deliver the same in the manner prescribed in Section 2; unless such gold coin, gold bullion or gold certificates are held for any of the purposes specified in paragraphs (a), (b), (c) or (d) of Section 2; or unless such gold coin or gold bullion is held for purposes specified in paragraph (d) of Section 2 and the person holding it is, with respect to such gold coin or bullion, a licensee or applicant for license pending action thereon.

Section 4. Upon receipt of gold coin, gold bullion or gold certificates delivered to it in accordance with Sections 2 or 3, the Federal Reserve Bank or member bank will pay therefor an equivalent amount of any other form of coin or currency issued or issued under the laws of the United States.

Section 5. Member banks shall deliver all gold coin, gold bullion and gold certificates owned or received by them (other than as exempted under the provisions of Section 2) to the Federal Reserve banks of their respective districts and receive credit on payment therefor.

Section 6. The Secretary of the Treasury, out of the sum made available to the President by Section 501 of the Act of March 9, 1933, will in all proper cases pay the reasonable costs of transportation of gold coin, gold bullion or gold certificates delivered to a member bank or Federal Reserve bank in accordance with Sections 2, 3, or 5 hereof, including the cost of insurance, protection, and such other incidental costs as may be necessary, upon production of satisfactory evidence of such costs. Voucher forms for this purpose may be procured from Federal Reserve banks.

Section 7. In cases where the delivery of gold coin, gold bullion or gold certificates by the owners thereof within the time set forth above will involve extraordinary hardship or difficulty, the Secretary of the Treasury may, in his discretion, extend the time within which such delivery must be made. Applications for such extensions must be made in writing under oath, addressed to the Secretary of the Treasury and filed with a Federal Reserve bank. Each application must state the date to which the extension is desired, the amount and location of the gold coin, gold bullion and gold certificates in respect of which such application is made and the facts showing extension to be necessary to avoid extraordinary hardship or difficulty.

Section 8. The Secretary of the Treasury is hereby authorized and empowered to issue such further regulations as he may deem necessary to carry out the purposes of this order and to issue licenses thereunder, through such officers or agencies as he may designate, including licenses permitting the Federal Reserve banks and member banks of the Federal Reserve System, in return for an equivalent amount of other coin, currency or credit, to deliver, earmark or hold in trust gold coin and bullion to or for persons showing the need for the same for any of the purposes specified in paragraphs (a), (c) and (d) of Section 2 of these regulations.

Section 9. Whoever willfully violates any provision of this Executive Order or of these regulations or of any rule, regulation or license issued thereunder may be fined not more than \$10,000, or, if a natural person, may be imprisoned for not more than ten years, or both; and any officer, director, or agent of any corporation who knowingly participates in any such violation may be punished by a fine, imprisonment, or both.

This order and these regulations may be modified or revoked at any time.

THE WHITE HOUSE  
April 6, 1933.

FRANKLIN D. ROOSEVELT

For Further Information Consult Your Local Bank

GOLD CERTIFICATES may be identified by the words "GOLD CERTIFICATE" appearing thereon. The serial number and the Treasury seal on the face of a GOLD CERTIFICATE are printed in YELLOW. Be careful not to confuse GOLD CERTIFICATES with other issues which are redeemable in gold but which are not GOLD CERTIFICATES. Federal Reserve Notes and United States Notes are "redeemable in gold" but are not "GOLD CERTIFICATES" and are not required to be surrendered.

Special attention is directed to the exceptions allowed under  
Section 2 of the Executive Order

### CRIMINAL PENALTIES FOR VIOLATION OF EXECUTIVE ORDER

\$10,000 fine or 10 years imprisonment, or both, as  
provided in Section 9 of the order

*W. C. Clegg*  
Secretary of the Treasury.

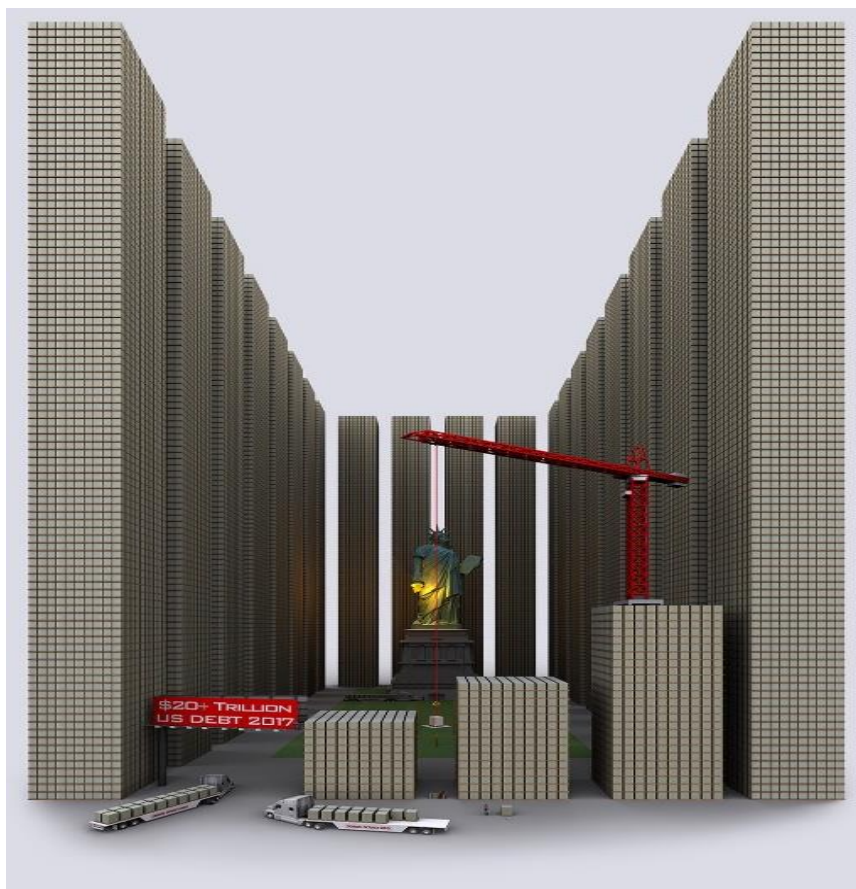
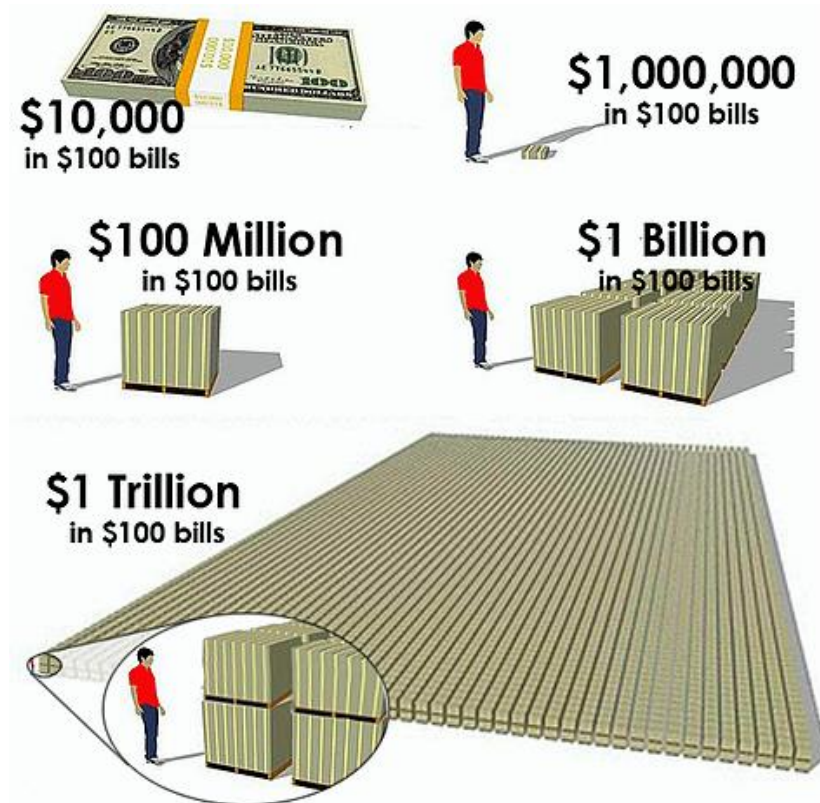
U.S. Government Printing Office: 1933. 2-15054

## Appendix 2. AAGR (Average Annual Growth Rate) 1959-2021

| FRED Graph Observations<br>Federal Reserve Economic<br>Data<br>Link: <a href="https://fred.stlouisfed.org">https://fred.stlouisfed.org</a> |        |        |        | Help: <a href="https://fredhelp.stlouisfed.org">https://fredhelp.stlouisfed.org</a><br>Economic Research Division<br>Federal Reserve Bank of St. Louis |         |        |        |
|--------------------------------------------------------------------------------------------------------------------------------------------|--------|--------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--------|--------|
| DATE                                                                                                                                       | M2     | AGR 59 | AGR 71 | DATE                                                                                                                                                   | M2      | AGR 59 | AGR 71 |
| 1/1/1959                                                                                                                                   | 286.6  |        |        | 1/1/1991                                                                                                                                               | 3287.7  | 3.82%  | 3.82%  |
| 1/1/1960                                                                                                                                   | 298.2  | 4.05%  |        | 1/1/1992                                                                                                                                               | 3381.2  | 2.84%  | 2.84%  |
| 1/1/1961                                                                                                                                   | 314.1  | 5.33%  |        | 1/1/1993                                                                                                                                               | 3419.1  | 1.12%  | 1.12%  |
| 1/1/1962                                                                                                                                   | 337.5  | 7.45%  |        | 1/1/1994                                                                                                                                               | 3474.9  | 1.63%  | 1.63%  |
| 1/1/1963                                                                                                                                   | 365.2  | 8.21%  |        | 1/1/1995                                                                                                                                               | 3492.4  | 0.50%  | 0.50%  |
| 1/1/1964                                                                                                                                   | 395.2  | 8.21%  |        | 1/1/1996                                                                                                                                               | 3647.9  | 4.45%  | 4.45%  |
| 1/1/1965                                                                                                                                   | 427.5  | 8.17%  |        | 1/1/1997                                                                                                                                               | 3834.7  | 5.12%  | 5.12%  |
| 1/1/1966                                                                                                                                   | 462.0  | 8.07%  |        | 1/1/1998                                                                                                                                               | 4056.6  | 5.79%  | 5.79%  |
| 1/1/1967                                                                                                                                   | 481.6  | 4.24%  |        | 1/1/1999                                                                                                                                               | 4403.3  | 8.55%  | 8.55%  |
| 1/1/1968                                                                                                                                   | 527.4  | 9.51%  |        | 1/1/2000                                                                                                                                               | 4666.9  | 5.99%  | 5.99%  |
| 1/1/1969                                                                                                                                   | 569.3  | 7.94%  |        | 1/1/2001                                                                                                                                               | 4975.8  | 6.62%  | 6.62%  |
| 1/1/1970                                                                                                                                   | 589.6  | 3.57%  |        | 1/1/2002                                                                                                                                               | 5453.9  | 9.61%  | 9.61%  |
| 1/1/1971                                                                                                                                   | 632.9  | 7.34%  |        | 1/1/2003                                                                                                                                               | 5804.5  | 6.43%  | 6.43%  |
| 1/1/1972                                                                                                                                   | 717.7  | 13.40% | 13.40% | 1/1/2004                                                                                                                                               | 6075.5  | 4.67%  | 4.67%  |
| 1/1/1973                                                                                                                                   | 810.3  | 12.90% | 12.90% | 1/1/2005                                                                                                                                               | 6424.1  | 5.74%  | 5.74%  |
| 1/1/1974                                                                                                                                   | 859.7  | 6.10%  | 6.10%  | 1/1/2006                                                                                                                                               | 6723.6  | 4.66%  | 4.66%  |
| 1/1/1975                                                                                                                                   | 906.3  | 5.42%  | 5.42%  | 1/1/2007                                                                                                                                               | 7108.5  | 5.72%  | 5.72%  |
| 1/1/1976                                                                                                                                   | 1026.6 | 13.27% | 13.27% | 1/1/2008                                                                                                                                               | 7504.8  | 5.58%  | 5.58%  |
| 1/1/1977                                                                                                                                   | 1165.2 | 13.50% | 13.50% | 1/1/2009                                                                                                                                               | 8275.3  | 10.27% | 10.27% |
| 1/1/1978                                                                                                                                   | 1279.7 | 9.83%  | 9.83%  | 1/1/2010                                                                                                                                               | 8458.5  | 2.21%  | 2.21%  |
| 1/1/1979                                                                                                                                   | 1371.6 | 7.18%  | 7.18%  | 1/1/2011                                                                                                                                               | 8823.2  | 4.31%  | 4.31%  |
| 1/1/1980                                                                                                                                   | 1482.7 | 8.10%  | 8.10%  | 1/1/2012                                                                                                                                               | 9735.6  | 10.34% | 10.34% |
| 1/1/1981                                                                                                                                   | 1606.9 | 8.38%  | 8.38%  | 1/1/2013                                                                                                                                               | 10481.1 | 7.66%  | 7.66%  |
| 1/1/1982                                                                                                                                   | 1770.4 | 10.17% | 10.17% | 1/1/2014                                                                                                                                               | 11079.9 | 5.71%  | 5.71%  |
| 1/1/1983                                                                                                                                   | 1959.4 | 10.68% | 10.68% | 1/1/2015                                                                                                                                               | 11747.4 | 6.02%  | 6.02%  |
| 1/1/1984                                                                                                                                   | 2138.2 | 9.13%  | 9.13%  | 1/1/2016                                                                                                                                               | 12475.9 | 6.20%  | 6.20%  |
| 1/1/1985                                                                                                                                   | 2332.4 | 9.08%  | 9.08%  | 1/1/2017                                                                                                                                               | 13295.3 | 6.57%  | 6.57%  |
| 1/1/1986                                                                                                                                   | 2502.1 | 7.28%  | 7.28%  | 1/1/2018                                                                                                                                               | 13876.1 | 4.37%  | 4.37%  |
| 1/1/1987                                                                                                                                   | 2743.9 | 9.66%  | 9.66%  | 1/1/2019                                                                                                                                               | 14446.8 | 4.11%  | 4.11%  |
| 1/1/1988                                                                                                                                   | 2847.4 | 3.77%  | 3.77%  | 1/1/2020                                                                                                                                               | 15410.0 | 6.67%  | 6.67%  |
| 1/1/1989                                                                                                                                   | 2991.7 | 5.07%  | 5.07%  | 1/1/2021                                                                                                                                               | 19378.7 | 25.75% | 25.75% |
| 1/1/1990                                                                                                                                   | 3166.8 | 5.85%  | 5.85%  |                                                                                                                                                        |         |        |        |
|                                                                                                                                            |        |        |        | AAGR 7.10% 7.16%                                                                                                                                       |         |        |        |

Created by the author

Appendix 3. Sheer quantity of money, visualization of US debt levels 2017)



Source: Robert Breedlove - Masters and Slaves of Money

