



## SCHOOL OF ECONOMICS AND MANAGEMENT

Business Administration

BUSN79 Degree project in Accounting & Finance

Spring 2021

# Is bitcoin money?

**Do bitcoin's properties fulfil the functions of money?**

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## Executive Summary

<b>Seminar date:</b> 4 <sup>th</sup> of July, 2021
<b>Course:</b> BUSN79, Degree project: Accounting & Finance
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<b>Five key words:</b> Bitcoin, money, store of value, unit of account, medium of exchange.
<b>Purpose:</b> The main purpose of this thesis is to investigate if Bitcoin's properties fulfil the three functions of money.
<b>Methodology:</b> We use a qualitative and a quantitative methodology in this paper. The qualitative approach focuses on interview findings where four interviews were conducted. The quantitative methodology focuses on additional findings like online data and in scientific books. The methodology has been used in a single case study.
<b>Theoretical perspective:</b> In order to answer the research question, the three functions of money is the primary theoretical framework used in this paper. The functions that are of focus is if Bitcoin could be considered a medium of exchange, as a unit of account and as a store of value.
<b>Empirical foundation:</b> Due to the combination of qualitative and quantitative methodology, the paper focuses on interview findings as well as additional data. The interview findings are presented based on the three functions of money whereas the additional data gathered are presented based on a historical perspective.
<b>Conclusion:</b> The paper concludes that BTC's properties fulfil two of the three functions of money as a store of value and medium of exchange. The third function, unit of account, is not yet achieved. In order to work as a unit of account BTC needs worldwide adoption by a majority of users, which is not the case as of now. Due to the volatility and the difference in need depending on geographical location, we see it as unlikely that BTC in the near future will function as a unit of account. One can however not diminish the fact that bitcoin in theory works well and could very well be adopted in the future as a unit of account if enough people accept BTC as a monetary medium.

## Acknowledgment

We would like to express our deepest gratitude to our degree project supervisor, Marco Bianco, who encouraged us to be professional in conducting the interviews and guided us every step of the way. Without his persistent help, this project would not have borne the fruit that it has. Moreover, we wish to acknowledge the support and love of our families and friends. They kept us moving forward, especially during the Coronavirus crisis, with all the obstacles that it posed. This work would not have been possible without their input and motivation

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## Introduction

Money transactions and trading are conducted extensively on the internet in modern society as a result of the exponential speed of technological development followed by the further globalization of the world. With the rapid adoption of the internet, a digital currency transfer mechanism, called Bitcoin (BTC) has been created. Economists generally characterize money as having three functions: it serves as a medium of exchange, a unit of account, and a store of value (Krugman, 1984). BTC is a form of digital currency that was launched as peer-to-peer open-source software in 2009 by an unknown figure named Satoshi Nakamoto. BTC is based on the concept of a non-governmental alternative currency with a finite amount of value. In comparison to fiat money issued by central banks and book money issued by commercial banks, which can be expended forever, new BTC are produced by a mathematical process within a computer network (Nakamoto, 2009).

In principle, if BTC were mainly used to conduct transactions, it would compete with fiat currencies, impacting the value and, more broadly, the monetary rules enforced by central banks. If, in contrast, BTC is primarily utilized as an investment, it will compete against a wide range of other assets, including treasury bonds, commodities and stocks, and may serve only a small role as function of money. Whether BTC possesses properties of a currency or an investment, the potential influence on the economy as a whole is decided by the market's acceptance and adoption of BTC (Baur, Dirk; Hong, Kihoon; Lee, Adrian, 2018).

This paper provides an overview of the development of money throughout history, as well as a glimpse of what the future of BTC will look like. The main purpose of the thesis is to investigate the money related properties of BTC and if it can be defined as money compared to fiat currency and gold. We contribute to the literature with an analysis of the current state of BTC and fiat currency and its implications for the usage of BTC as a currency. Moreover, the paper provides the reader with a new paradigm for describing the evolving monetary system, identifying the function of money, and explains how different types of money interact with one another. The reader can expect an informative insight on how and why humans deal with their preferred currencies—from barter, paper money, and gold to digital money such as BTC—by tracing the history of money. Along with examining the evolution of currencies, this paper addresses a critical question: what does the future of money and BTC entail? For the majority of people, money is already digital. Mobile apps are used to monitor bank accounts and make contactless payments, and people are gradually embracing a cashless lifestyle around the world. However, now that BTC has captured the

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monetary imagination of the world, digital currency has taken on a new significance. One of the reasons for this paper is that the study of money lacks the correct vernacular and analytical structure to include BTC; it urgently requires an overhaul to include this modern form of money.

Updates to the study of finance, or monetary research, are incredibly rare, and in order to better conceptualize BTC's effect on the future of money, this paper looks to its history. BTC and its many iterations provide the world with a new start of transparency and choice that it requires as it prepares for the next iteration of currency. This paper is an attempt to comprehend and illustrate how BTC can be integrated and how it will affect the fate of the monetary system. Hereby, we explain the study of money itself, which has traditionally been studied in doctoral-level economic theory, because few understand where money comes from or what a monetary mechanism really intends to solve. The aim of this paper is to reframe our monetary structure for the uninitiated and clarify it from the ground up in order to analyze BTC's function as a currency compared to fiat currencies and gold.

To answer our main research question "Is Bitcoin Money?", more precisely "Do BTC's properties fulfil the function of money?", we use a qualitative and a quantitative methodology in a single case study. The qualitative methodology focuses on interview findings whereas the quantitative methodology focuses on theoretical findings and data. Due to integrational problems, we gave more focus to the different methodologies in different parts of the work. To contribute to the existing literature, we provide four qualified interviews that provide the thesis with unique information that gives us a strong empirical foundation. The interview findings were retrieved from semi-structured interviews where the interviewees had different areas of expertise and knowledge about the research topic. The already existing data within the research field were retrieved from scientific literature and books. The data contributing to the literature findings stem mainly from databases such as St. Louis Federal Reserve Bank (Fred), the OECD, the World Gold Council, and Blockchain.com. We contribute to the literature with an in-depth analysis of Bitcoin's properties of money and its implications on the usage of Bitcoin as a currency in the future of our monetary society.

We argue that Bitcoin does behave as a monetary medium since it provides two of the three main money functions. We believe that, even though some of the findings are contradicting, bitcoin could possess the means of a medium of exchange as well as a storage of value. Due to various reasons, we believe that bitcoin does not meet the requirements as a unit of account. However, the findings suggest that, if certain criteria are met, bitcoin could

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serve as a monetary medium in the future.

The paper proceeds as follows. Section 1 discusses the current state of the literature and previous studies made on the topic. Section 2 provides the current state of money based on the historical background of currency and gold. Section 3 provides the theoretical findings of the development and practical usage of BTC compared to fiat currency and gold. Section 4 describes the methodology and the research design. Section 5 presents the interview findings in regard to BTC and fiat money as well as their properties and usage in today's economy. Section 6 provides a discussion and analysis of use of BTC today based on the findings. Finally, Section 7 offers concluding remarks.

### 1. Literature Review

The current literature examined in light of the current research can be divided into two major parts. In the first group, we analysed books and scientific papers on the origins and current state of fiat currency and gold. The second category contained BTC-related books and scientific studies about how BTC is classified as money and whether or not its properties enable it to be integrated into our monetary system. Historically, money has been defined through three main functions being a medium of exchange, a unit of account, and a store of value (Krugman, 1984).

Mitchell-Innes was a proponent of what became known as the credit theory of money, according to David Graeber's (2014) "Debt– The First 5000 Years." Currency units are merely abstract units of measurement, and as credit theorists rightly observed, such abstract forms of accounting originated well before the use of any particular token of trade. As a result, a coin is also described as an IOU ("I owe you"). Whereas conventional wisdom holds that a banknote is or should be a guarantee to pay a certain amount of "real money" (e.g., gold), credit theorists argued that a banknote is simply a promise to pay something worth the same as an ounce of gold. According to credit theorists, there is no intrinsic distinction between a silver dollar, a coin made of copper–nickel alloy crafted to resemble gold, a paper currency, and a digital data set on a bank's computer screen (Graeber, 2014).

Money, according to Nik Bathia's (2021) "Layered Money," could not only be seen as a medium of exchange and a store of value; it is also a counting mechanism. It is a method of listing costs, tallying sales, estimating earnings, and consolidating all economic activity into a single accounting denomination. Accounting denominations are used to define people's revenues, costs, and profits, much like religious denominations are used to define people's religious values. Pricing products and services becomes simpler as people rely on a single accounting denomination so that all participants have the same idea about what is called currency. According to Bathia, economic activity flourishes where all participants can name their price in the same words (Bathia, 2021).

Böhm-Bawerk (2017) surveyed and critiqued interest theories from antiquity to the present, provides a complete theory of the mechanism of production, and defends the role of capital in production and time in the calculation of the interest rate. Böhm-Bawerk expanded on Carl Menger's time preference ideas, arguing that there is still a gap in value between present goods and future goods of similar nature. Furthermore, he argues that the value of potential future goods decreases as the time required to produce them increases. His

conclusions are as follows: first, the supply of goods in a growing economy will still be greater in the future than it is now. Second, due to carelessness and shortsightedness, people have a propensity to neglect their potential needs. Finally, entrepreneurs would like to start manufacturing products that are already available instead of waiting for potential goods and halting production (Böhm-Bawerk, 2017).

Ludwig von Mises (1981), in “The Theory of Money and Credit,” incorporated monetary theory into the main body of economic research, offering fresh, new insights into the nature of money and its position in the economy. Mises investigated the sources, existence, and importance of money, as well as its effect on monetary policy. Moreover, he discussed why money is demanded in its own right. The literature on BTC is still in its early stages, but it has evolved rapidly in recent years. Most academic studies classify BTC as an investment due to its high uncertainty (Baur & Dimpfl, 2021; Yermack, 2015; Litwack, 2015). In contrast, some articles show that BTC displays store-of-value characteristics over long time horizons (Baur & Dimpfl, 2021).

According to D. Yermack (2015), BTC’s daily value should become more predictable in order for it to function as a reliable store of value and a unit of account. The author argues that BTC is a ground-breaking open-source artifact that can transform the way people think about currencies as well as a proof of concept about how aspects of foreign exchange could disenfranchise banks and other organizations as payment service providers (Yermack, 2015). According to D. Yermack (2015), the global commercial use of BTC remains very small, meaning that only a handful of people see BTC as a medium of exchange, and those who do could be hindered by the long transaction times and the security measures that are in place. He also argues that BTC is ineffective as a unit of account and a store of value. Furthermore, BTC lacks other features that are typically associated with modern-day currencies. One example is that BTC can only be obtained via so called “digital wallets” and not via financial institutions like banks. The “digital wallets” are vulnerable to predators and are expensive to manage. Yermack also argues that BTC’s daily value must become more predictable in order for it to function as a reliable store of value and a unit of account in commercial markets. In spite of its many flaws, such as the environmental cost of manufacturing and maintaining it, the previously mentioned volatility, the relative ambiguity of when a transaction is final, or the associated fraud causing significant losses, Yermack argues that BTC has been used in limited but not insignificant cases for small to very large transactions as it was originally intended back in 2009 (Yermack, 2015).

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According to the found of BTC, Satoshi Nakamoto, and Nakamoto's article "Bitcoin: A Peer-to-Peer Electronic Cash System," BTC—as a peer-to-peer version of digital currency— can enable people to send transactions without having to pass through a financial institution like a bank. The advantage however are lost if a third party would be needed in order to avoid transaction errors (Nakamoto, 2009).

The paper "The volatility of Bitcoin and its role as a medium of exchange and a store of value" by D. G. Baur and Thomas Dimpfl (2021) demonstrates that the volatility of BTC prices is severe; almost 10 times that of major exchange rates (U.S. dollar against the euro and the yen). The authors argue that the excess volatility also has a negative impact on its future position in portfolios. According to the authors' analysis, BTC cannot function as a medium of exchange and has only minimal utility as a risk diversifier. It must be stable or backed by a government in order to function as a currency. In comparison, the authors used BTC's deflationary design as a theoretical foundation and demonstrated that BTC demonstrates store-of-value characteristics over long time horizons (Baur & Dimpfl, 2021).

The article "Bitcoin: Medium of exchange or speculative assets?" by D. G. Baur, K.H. Koong, and A. D. Lee (2018) examines whether BTC is a medium of exchange or an asset, and more precisely, what use there is today and what type of characteristics will eventually specify BTC area of usage. The authors examined BTC's statistical properties and discovered that they are uncorrelated with those of conventional asset groups such as stocks, bonds, and commodities. Their study of BTC transaction data reveals that BTC is mostly seen as an investment rather than a medium of exchange (Baur, Dirk; Hong, Kihoon; Lee, Adrian, 2018).

R. White, Y. Marinakis, N. Islam, and S. Walsh (2020) conducted exploratory studies to determine whether BTC is a commodity, a technology-based product, or something else. The authors used a series of tools to compare BTC to currencies and relatively technical types of assets. They came to the conclusion that BTC's activity is similar to a commodity or an asset, which they argue should mean that existing currency and security regulations should not be applicable to BTC or other crypto currencies (White, Marinakis, Islam, & Walsh, 2020).

According to C. Piana's (2017) article "Bitcoin: An Open-Source Currency and More," the rise of a cryptocurrency in the digital world was overlooked for years before the general press began to report BTC's more than tenfold increase in price in a few months in 2017 (Piana, 2017).

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In his essay “Bitcoin: Money or Fool’s Gold?: A Comparative Study of the Legal Status of Bitcoin,” author S. Litwack argues that while BTC is considered by some countries as a medium of exchange or as a currency, it was not expressly proclaimed a currency by any nation participating in the survey. Nations around the world have chosen not to classify BTC as a currency for a variety of reasons. A currency, according to FinCEN, is “the coin and paper money of ... any ... nation that is designated as legal tender, [ii] circulates, and [iii] is customarily used and accepted as a medium of exchange in the country of issuance.” According to the author, BTC does not meet any of these requirements for a currency. Furthermore, he contends that nations that have provided BTC guidance or legislation seem to prefer characterizing BTC as both a currency and an investment. Furthermore, the author argues the U.S. should view BTC as a currency and as an investment/asset in order to achieve fairness between the pros and cons of BTC (Litwack, 2015).

Selgin (2015) suggests the word “quasi-commodity currency” as a potential workaround for base money that has no nonmonetary uses and is scarce, where the author uses BTC as an example of that. Standard treatments, according to his paper, allow for only two types of base money: commodity money and fiat money. As the term implies, “commodity” money is made up of some useful article of trade, that is, something that has a function of not only being a medium of exchange, which is also scarce, in the sense that it instructions a positive value in equilibrium that is equal to its marginal cost of production (assuming competitive suppliers). In contrast, “Fiat” money is commonly considered to consist of paper notes or central bank deposit credits easily convertible into such notes, which are exclusively valuable as exchange media and command a value in equilibrium much beyond their zero or near-zero marginal cost of production. As a result, the shortage of fiat money is not a “natural” scarcity, but one that must be produced. Commodity money is vulnerable to supply and shocks, while fiat money can be manipulated by central banks. A “synthetic commodity” base money is something that has little nonmonetary value but is very scarce. Unlike other forms of synthetic commodity money, BTC has a positive— although slowing—growth rate. Selgin contends that—if properly planned —more macroeconomically advanced synthetic commodity money might provide the foundation for uniquely stable monetary regimes (Selgin, 2015).

According to Baur et al (2018), if online currencies become a medium of exchange, it could possibly be an alternative to conventional currencies. This requires a dual or even multiple currency systems where different fiat and online currencies coexist. There are

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numerous examples of dual or multiple currencies existing in history (Baur, Dirk; Hong, Kihoon; Lee, Adrian, 2018).

Based on the literature we find that most of the presented authors argue that BTC behaves only as a store of value and not as a medium of exchange and unit of account. According to most of the articles, BTC does not function as a currency rather is a speculative investment due to its high market volatility. While there have been many attempts to analyse the economic properties of BTC, particularly from Baur and Dimpfl (2021), Yermack (2015), Litwack (2015), and Lee and Adrian (2018), those authors follow a narrow path and miss the broader context. Many descriptions of BTC have avoided tackling the technology behind it, and most authors have not made serious attempts to understand what BTC's underlying function could mean for the monetary economy. Therefore, in light of the present study, we focus on a broader economic context with BTC's current function as money and whether it provides monetary use to function as a store of value, medium of account, and unit of account. We used semi structured interviews as a research contribution, which is a technique absent from previous research methods in the literature.

## 2. Secondary Findings

### 2.1. Money

To understand BTC, this paper first analyzes the study of the function and history of money. Historically, money has been defined through its three main functions as (Krugman, 1984): “Money, the classical economists argued, serves three functions: it is a medium of exchange, a unit of account, and a store of value.” Foreign money has the same purpose: it is used to settle international payments, fix prices, and serve as a liquid asset in international transactions. A basic method for individuals to exchange value is to exchange items of value. This method of direct exchange is known as barter. Barter has always existed and exists throughout human history, although it is exceedingly impractical and can be employed only under rare conditions. Individuals in a more advanced and larger economy can specialize in producing and exchanging more things with more people. The larger the demand, the more specialization and trade possibilities but also the larger the coincidence of the wishes, which means that what someone wants to buy is created by a person who does not want what the other individual has to offer (Krugman, 1984).

One way around this is by indirect exchange: for example, company A can try to identify a good or service that person B wants and find someone who can swap it with business A for what business A wants to sell. The medium of exchange is called the intermediate good. Although everything that is excellent may be considered as a medium of exchange, as the market develops, individuals cannot find various things their counterparty is continually seeking for and exchange for each trade they wish to make. Money refers to a good that serves as a widely accepted medium of exchange as one of the main functions of money. Although investing is frequently intended to generate income that can be traded for other goods, it differs from money in several ways: investments provide a return and money does not; moreover, investments always contain the possibility of loss, where money has the lowest risk possible. Carl Menger (1892) created an explanation of the most crucial feature that enables money on the market, namely salability (Menger, 1892).

People must have some level of expectation about the future value of a medium of exchange for it to function. Krugman (1984) argues that one function of money can affect the others. He states: "In fact, there is some inter-dependence among roles. The links which seem clear are these: if the dollar is a good store of value, the costs of making markets against the dollar are lower, thus encouraging the vehicle role." Krugman claims that valuation will theoretically push the dimensions and prevail over liquidity as a decisive factor in choosing

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an exchange medium. The effect also functions the other way around, for example the demand of one function can affect other functions as well. Since a medium of exchange's liquidity accounts for a significant portion of its demand, media of exchange whose demand is heavily reliant on liquidity (for example, fiat currencies or BTC) are more vulnerable to this risk than other media of exchange (e.g., anything that can affect its value, for example consumption). The physical integrity and changes in supply determine the store-of-value function on the supply side (Krugman, 1984).

Many items have served as currency in history: gold and silver, copper, seashells, large stones, salt, horses, government paper, and so on. The relative salability of items can be measured by how well they address three aspects: their salability across scales, space, and time, where the lattermost factor is the most important factor to understand. Salability across time refers to a good's ability to retain worth over a long-time horizon, enabling holders to store money. This is money's second function: it serves as a store of value. An item must be resistant to rust, corrosion, and other types of deterioration in order to stay valuable over time. Moreover, the delivery of items should not increase too much throughout the period that the holders possess it in order to retain its worth (Krugman, 1984; Menger, 1892).

The availability to limit creation in order to keep the existing unit's value has been typical for money throughout history. The relative difficulty in generating new currency units affects the hardness of money: hard money is money with hard supply to increase, whereas easy money is money with easy supply to increase (Salerno, 2010).

The hardness of money may be understood according to A. Fekete (1997) by taking into account two distinctive quantities with regard to the supply of the good: firstly, the stock, which is the current supply, consisting of all things produced in the last minus the units that have been lost or consumed. Secondly, the flow which is the additional output which is produced in the next period of time. The stock-flow ratio is a precise assessment of the hardness and the suitability of an item as money. A good with a low stock-to-flow ratio has a present supply that may be greatly increased if people begin to use it as a store of value. The bigger the stock to-flow, the more probable it is that a product will hold its value over time and hence be more salable over time (Fekete, 1997). The Author argues further that the purchase would increase demand for the hard money, enabling the price of it to increase and encourage suppliers to get more out of it if buyers chose a high stock-to-flow ratio. However, because the flow is restricted in proportion to the present stock, a significant increase in new output is unlikely to significantly decrease the price if people chose money with a low stock-to-flow ratio. This means it would be insignificant for the makers to produce large volumes

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leading to a reduced price and eventually hinders the products salability over time. This is also known in the literature as the "easy money trap", which means that anything that has an increase in supply without an equal increase in demand can destroy the value of whatever is stored (Fekete, 1997).

When a natural, technical, or political change causes a fast increase in the supply, the monetary good could lose some of its characteristics and be replaced by something else with a more consistent stock-to-flow ratio. Seashells, for example, have been used as money throughout history when scarcity was high and stray cigarettes for example could today be seen as a medium of exchange since they are hard to get. When it comes to national currencies, the lower the pace of production growth, the more probable the currency will be owned by people and preserve its value over time. As technology enabled trading of seashells, civilizations that relied on them shifted to other means of storing value. Similarly, if a government would expand the quantity of its currency, its citizens gravitate to owning other currencies, gold, or more dependable monetary assets. Individuals can normally use whatever commodities they like as a medium of exchange, but those who utilize hard money will benefit the most in the long term because their medium of exchange loses relatively little value owing to the low new supply. Those who chose easy money risk losing value when its supply rises swiftly, decreasing its market price. The hardness of various kinds of money, and hence their salability, has evolved as different civilizations' and periods' technological capabilities have evolved. In truth, the decision of what earns the most money is frequently impacted by the technological realities of civilizations, which define the salability of diverse items. Money, according to Austrian economist J. Salerno (2010), is defined as "whichever money emerges freely selected on the market by the individuals who deal with it, rather than being imposed on them by coercive authority," which means that the value of money is agreed upon by its users rather than governmental bodies (Salerno, 2010).

Aside from the stock-to-flow ratio, another key feature of the salability of a monetary medium is the acceptance rate of those who are supposed to use it. An increase in acceptance would in theory make it more liquid, this results in a more stable currency. The benefits of the network is correlated to its size (as seen in the cases of Facebook, Instagram, etc.). Less well known is that the power of network effects may vary substantially, influencing both value creation and capture. The value of a platform grows exponentially with the number of members. For example, as Facebook's user base grows, so does the volume and variety of fascinating and relevant content (Zhu & Iansiti, 2019). As previously stated, a medium of

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exchange is acquired for its salability rather than its intrinsic properties, which means that a network effect can have a significant impact on people adapting to a new monetary medium.

Furthermore, widespread use of a medium of exchange enables users to compare the value of different goods or services with one another. This is the third function of money: a unit of account. Money's fundamental purpose, to aid trading is what also enables economic planning and budgeting. Individuals find it more difficult to make production, consumption, and trade decisions when economic output evolves from the most primitive scale. When there is no defined medium of exchange, each good or product must be valued between each other resulting in very difficult calculations and budgeting. In an economy with a medium of exchange however, the price of each good or service would be stated in terms of the same unit of exchange. In this economy, money could be used as a meter for comparing value where it gives both buyers and sellers information on what they need to share/pay in order to sell or obtain a certain item/service and this is only able to happen with a standardized medium of exchange that serves as a unit of account (Krugman, 1984; Salerno, 2010).

The broader the economy, the bigger the advantages are. A medium of exchange allows for specialization where store of value encourage individuals to focus resources toward investment rather than consumption. A unit of account allows for the comparison between goods and services (Krugman, 1984; Menger, 1892; Salerno, 2010).

Throughout the history of money, various goods have served as money. Based on the technological capabilities of each period there has been a difference in hardness and soundness. From seashells all the way to governmental money, each stage of technical advancement has enabled humans to use a new type of money with added advantages, but also new drawbacks. This paper attempts to distinguish the characteristics that make for “good” money from those that make for “bad” money by analysing the history of the instruments and materials that have been used in the function of money throughout history. Only with this foundation in place can the reader go on to comprehend how Bitcoin works and what its role as a monetary medium entail. As a result, the following chapter explores briefly the history of items used as money throughout history. Understanding how and why money evolves is critical to understanding the potential evolution of money and the position Bitcoin might play (Bathia, 2021).

### 2.2. History of ancient forms of money

According to E.A. Morse (2018), Yap Island had the monetary form with the most qualities akin to those of Bitcoin. Understanding how the enormous round limestone boulders functioned as money will assist in understanding the function of BTC. Furthermore, learning the intriguing narrative of how the Rai stones lost their monetary significance teaches how a currency can lose its monetary status when its hardness deteriorates (Morse, 2018). The Rai stones were of different sizes, formed by a hole in the center of wide circular disks weighing up to four metrical tons. The scarcity made the stones valuable as well as the intense work required to obtain new ones. The mining and transport of one stone required over one hundred people. The owner could therefore pay with the stone without moving it by notifying all townspeople that possession of the stone had been transferred to the receiver. The stone's ownership would be recognized by the entire community, and the receiver could then use it to make payments as he wished. Since the stone's ownership was known to all, there was no way to steal it. The varying sizes of the different stones— as well as the option to pay in fractions of a single stone—offered some degree of salability across scales. The difficulty and high expense of importing fresh stones as well as the mining and transport costs assured the stone's long-term value. Because of the high expense of bringing fresh stones to Yap, the current supply was still much greater than any new supply might be generated in a specified amount of time. To conclude, rai stones has an extremely high stock-to-flow ratio where it was almost impossible to increase supply by bringing in more rocks (Morse, 2018).

When an American called David O'Keefe discovered Yap Island, he recognized a financial potential in buying coconuts from the island with Rai stones (Klingman & Green, 1952). As he did so, it was unavoidable that stone mining would become much less expensive than before due to the technology he brought with him. The stock-to-flow ratio for Rai stones decreased dramatically with new technology: It made sense to mine some stones each year which ultimately depreciating the island's present stock. It became riskier for everyone on the Yap Islands to utilize these stones as a store of value, and as a result, their salability and role as a medium of trade dwindled over time. The details may vary but a drop in the stock-to-flow ratio has been almost the same for every currency that has lost its value throughout history, not lately the Venezuelan bolivar (Hanke & Bushnell, 2016). Cattle, seashells, and beads used in West Africa, North America, and Asia were also ancient sources of currency that lost their monetary value over time. Humans has over time created superior types of money to these historical stores of values as technology progressed, and they started to

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rapidly replace them. Metal like gold for example are a more powerful medium of exchange since it can be more easily stored and transported (Morse, 2018).

### 2.3. Gold

As humans' technological capacity for producing goods improved and consumption of metals and resources increased, metals began to be produced in sufficient numbers to make them highly salable across time and acceptable for use as monetary medium. They were simpler to carry than salt or cattle due to their density and relative high value, making them extremely salable across space. Metal manufacturing was originally complex, making it difficult to rapidly grow supply while retaining reasonable salability over time. Because of their physical properties and their quantity on Earth, some metals were more scarce compared to others. In the absence of breakthroughs in refining processes, rarer metals, such as silver and gold, were more durable in their basic states, making them a better alternative to store value over time. Because of gold's near indestructibility, humanity was able to hold value for millennia, allowing them to develop a longer time horizon. Pure gold is practically indestructible. Because it does not corrode, rust, or tarnish like other metals, all gold taken from the soil is still melted, re-melted, and reused. (Szabo, 2002).

Metals were first bought and sold by weight, but as technology advanced, it became more feasible to melt metal into standardized coins making it more salable by eliminating the need of scales etc. Gold, silver, and copper were the three most often used metals for this, and they were used as money for around 3,000 years. Because of the introduction of commercial banking and developments in communication methods, individuals could trade using paper money that was guaranteed by gold often stored in a local bank by the nineteenth century. This enabled gold backed transactions of any size, eliminating the requirement for silver's monetary position and centralizing the gold standard's critical monetary salability features. The gold standard enables global capital accumulation and commerce by enabling a majority of the world's economy to trade in a single currency. However, by centralizing gold in bank vaults and subsequently national banks, banks and governments were given the opportunity to increase the quantity of money leading to a transfer of value from holders to governments and banks (Szabo, 2002).

Commodity money changes throughout time, and it is possible to distinguish between a good's market demand, which is the desire of keeping the goods for consumption and its

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monetary demand, which is the desire of keeping the goods for future use as a medium of exchange or as a store of value. Whenever an individual prefers a product as a store of value, it essentially raises the demand for it above the normal market demand, causing the price to increase. Additional demand causes a sudden surge in prices, motivating a rise in production and supply, which decreases prices, penalizing those who purchased above the regular market price. Therefore, to act as a good store of value, a good must appreciate when consumers demand it, but the suppliers must be restrained from inflating the stock substantially enough to push the price down. Gold has maintained its monetary status since it cannot be synthesized from other chemicals, the only way to maximize production is to mine gold from the planet which is costly and an unpredictable process (Selgin, 2015; Szabo, 2002).

The global gold reserve is the result of thousands of years of production. According to the U.S. Geological Survey, this growth trend has always been around 1.5% over the last seven decades with reasonably accurate figures, only reaching 2% between 1900 and 2010 (U.S. Geological Survey, 2021). A huge increase in demand and a resulting price rise that induces a doubling in annual supply would be negligible for gold. If the current enhanced production rate is maintained, inventories might grow more rapidly, making further increases less relevant. It is still almost impossible to mine enough gold to have a greater effect on the price and drastically lower it. The reason as to why gold has maintained its monetary status for so long is because of the relatively low cost of supply, favored by the central banks, which hold around 35,000 tons in order to support their paper currencies (U.S. Geological Survey, 2021).

If raw materials are scarce, supply of certain commodities will be limited regardless of price. Gold, for example, is considered inelastic since there is a finite amount of the raw material accessible, independent of market value. Gold has the lowest price elasticity of supply due to its high stock-to-flow ratio, Official central bank gold reserves are currently about 35,000 tons (Selgin, 2015; Szabo, 2002).

The twentieth century began with governments obtaining possession of their people's gold through the creation of a new central bank. This enabled the government to increase its money supply even beyond the gold value resulting in a depreciation. The banks continued to do so until the 1960s when the world started to move towards the dollar standard. Gold were technically demonetized in 1971, central banks kept considerable gold holdings and only gradually disposed of them before beginning gold acquisitions in the following decade. In terms of monetary rivalry, keeping gold reserves is a reasonable move. Keeping reserves in a foreign cheap currency however could lead to a drop in value, both for the holder's currency

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as well as the reserve currency. Long term, the monetary fight between gold and governmental currencies will only result in one winner. Even in a world of government money, as seen by their actions, the government has not been able to eliminate gold's monetary role (Bathia, 2021; Graf, 2013).

### 2.4. Fiat Money

Historically, World War I marked the end of market-determined monetary medium and the beginning of the period of government money. Political edicts, choices, and monetary policies define the world's monetary reality as gold continues to underlie the global monetary system. The phrase "fiat money" refers to government money and is derived from the Latin word meaning edict, command, or authority (Graf, 2013). There is a distinction between government money that can be redeemed in gold and government money that cannot be redeemed in gold. Money is gold under a gold standard, and the government is only responsible for producing standard units that is backed by gold where they have no control of the actual quantity of gold in the economy. The government's debt and/ or paper are utilized as money with irredeemable government money, and the government can raise its supply as the economy needs. Anyone who uses other sources of currency for trade or attempts to make more of the government's money risks being punished. No fiat currency has ever been issued exclusively by the government; all were initially redeemable in gold or silver. Government paper currency gained its salability only through its redeemability into salable forms of money. Today, all countries central banks hold reserves in order to support their national currency. Most governments retain some gold in reserve, and those that don't often have reserves in other countries' currencies which is the often backed by gold. There is currency in the world that is not backed by anything (Bathia, 2021; Szabo, 2002; Selgin, 2015).

Government money is vulnerable to getting an increase in supply that does not match the increase in its stock, resulting in loss of salability and the loss of purchasing power for its holders. In this sense, fiat money differs from gold, the production of which cannot be enlarged due to the previously explained fundamental chemical qualities of the metal. The fundamental distinction between World War I and prior battles was not geopolitical or diplomatic in nature, but rather monetary in nature. When governments employed the gold standard, they controlled the gold while their citizen had to cope with paper receipts for this wealth. In the heat of the war, the simplicity with which a government could print more paper

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money was far too appealing and far simpler than seeking taxes from its people. The government could therefore pay the war indefinitely as long as the money they created was acknowledged by its people as well as outsiders. As a result, following the end of the war, the actual value of the currency of all major European powers had dropped significantly. Germany and Austria, the defeated countries, saw their average currency value fall to 51% and 31% of what it was in 1913 in November 1918, respectively (Hall, 2001).

With gold redemption from central banks and international gold movement stopped or highly limited in the bigger economics, governments could keep the value of the currency pegged to gold at its level prewar. When the war came to an end, the international banking system based on the gold standard was made obsolete. This move diverted money from the market and redirected it into politically decisions. Instead of allowing the market to choose the most suitable salable item as a medium of exchange, governments instead controlled the value, supply and interest rate for money, resulting in a monetary system dubbed “monetary nationalism” by F. Hayek in 1989 (Hayek, 1989):

*“By Monetary Nationalism I mean the doctrine that a country’s share in the world’s supply of money should not left to be determined by the same principles and the same mechanisms as those which determine the relative amounts of money in its different regions or localities.”*

- F. Hayek (1989)

For the first time in human history, everyone on the earth utilized government funds. It is theoretically conceivable to manufacture an artificially scarce asset and give it monetary worth. Governments worldwide did this after dropping the gold standard, as did BTC’s founder, with varying degrees of success. Since the bond between fiat money and gold was broken, paper currencies experienced faster supply growth than gold, resulting in a decline in their value relative to gold. According to the type and size of the account in which the instrument is maintained, the various forms of money in the money supply are commonly categorized as Ms, such as M0, M1, M2, and M3. The supply of money indicates the different forms of liquidity available for each form of money. M1, for example, is also known as “narrow money”, which contains notes and coin that are in circulation as well as other equivalents that can quickly be turned into cash. M2 include what was mentioned in M1 as well as short time deposits in banks as well as money funds. The overall M2 money supply in the United States was about \$600 billion in 1971 but in excess of \$19 trillion in 2021, rising

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at a 6.8% annual rate (Federal Reserve Bank of St. Louis, 2021). Similarly, one ounce of gold was worth \$35 in 1971; now, it is worth more than \$1,600 (see Figure 1).

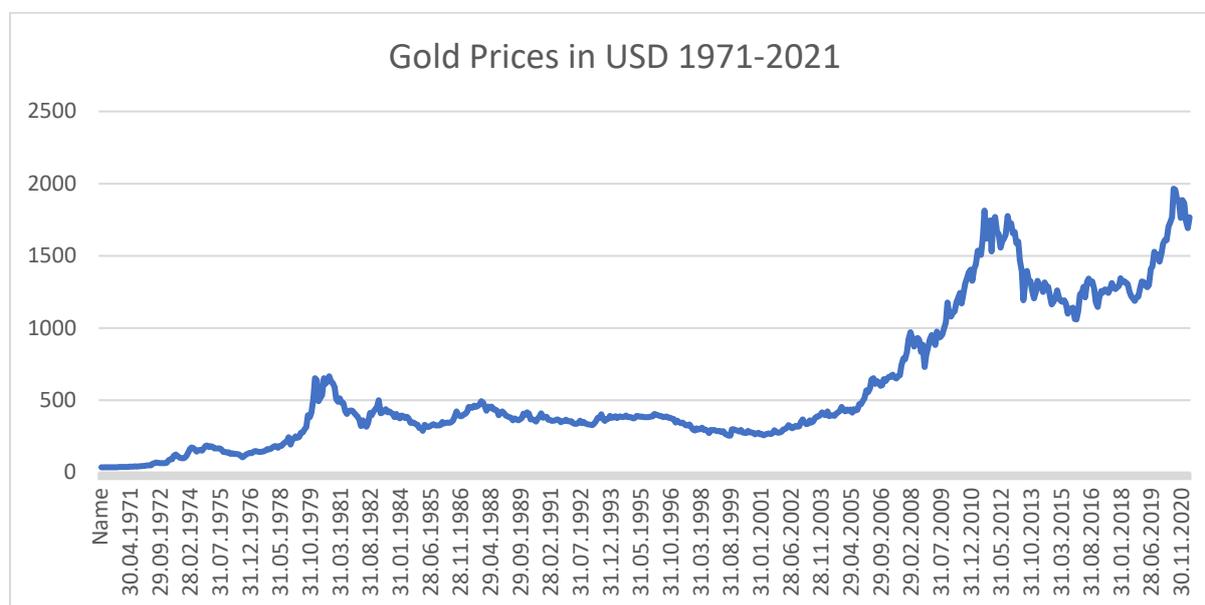
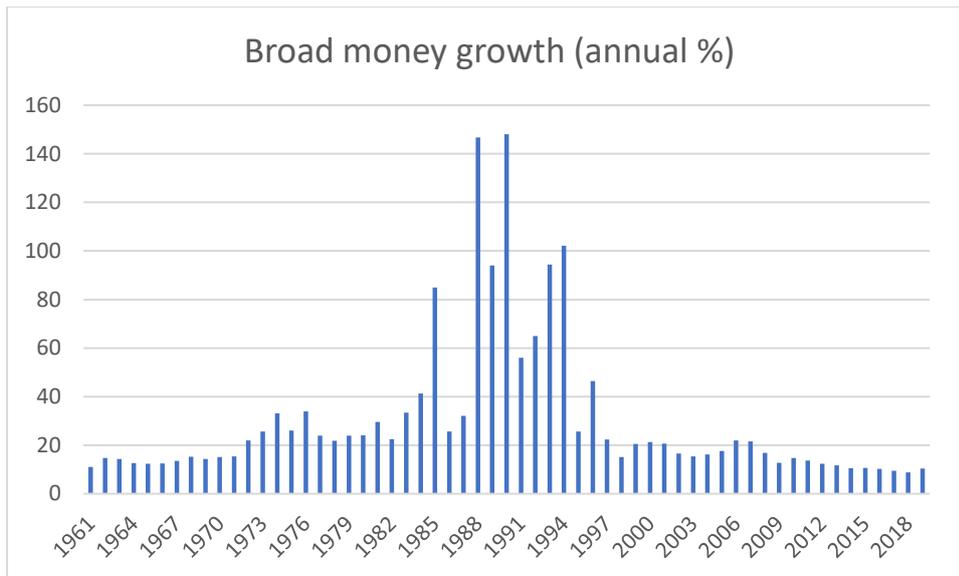


Figure 1 Historical Gold Prices in U.S. Dollars Between 1971 and 2021 (U.S. Geological Survey, 2021)

The history of fiat currencies offers a mixed picture of various currencies' stock-to-flow ratios through time. The developing world's comparably stable and strong currencies usually experience growth within the single digits but with a far greater range that includes supply contractions during deflationary recessions. Because banks produce money when they make loans, loan repayments or the borrower's bankruptcy can reduce the money supply. Money's supply can rise or fall as a result of various government and central bank decisions. Developing-country currencies have often undergone an increase in its supply rates equivalent to consumable commodities, resulting in catastrophic hyperinflation and loss of value for holders. The figure below indicated money growth for 167 countries from 1961 to 2019, provided by the World bank: Figure 2 illustrates the data for the annual average for all countries. Although data for all countries and years might not be complete, the average increase in money supply is 30.2%, several hyperinflationary years have been replaced with an alternative one.

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*Figure 2 Broad Money Average Annual Growth Rate for 167 Currencies, 1960–2019 (The World Bank, 2021)*

During hyperinflationary periods, people in industrialized nations seek to sell their native currency in order to purchase alternatives like durable items, gold, commodities or other foreign currencies. The USD, euro, yen etc. are all widely accepted as reserve currencies where it meets a lot of the global demand for a store of value. The explanation for this is clear as one considers the growth rate of the supply which over time has been comparatively slow over time. According to OECD statistics, the annual broad money supply growth rate in OECD countries averaged 9.98% between 1981 and 2020. Figure 3 depicts how the world's the supply growth rate has been for the major national currencies. Developed nations' currency supply has grown at a slower rate than emerging economies which has led to fewer price rises and cases of hyperinflation in recent years. Broad money in industrialized countries has risen at rates ranging from 2% to 10%, average around 5%, and seldom surpassing double digits or sliding into negative territory. According to OECD statistics, developing countries' growth rates are much more volatile which can result in greater financial instabilities for that specific country and its currency.

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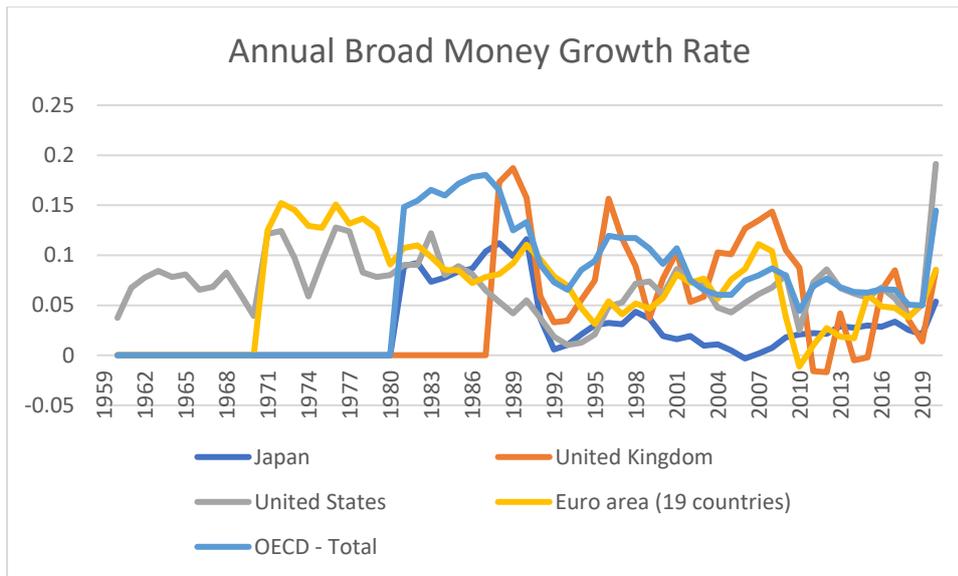


Figure 3 Annual Broad Money Growth Rate in the United Kingdom, Japan, United States, and Euro Area (OECD, 2021)

Hyperinflation is a type of economic calamity that is specific to governmental money. There is not a single case where hyperinflation has happened with a gold or silver standard, and even with ancient currencies like seashells, they lost value gradually and not in a relatively fast phase. However, for government money, which has a zero cost of production, it could be possible that an entire country's value in money disappears in the matter of months like in the case of the Venezuelan bolivar of the last decade or the Weimar Republic in the 1920s (Graeber, 2014; Bathia, 2021; Hayek, 1989; Hanke & Bushnell, 2016). Inflation under the Weimar Republic in the 1920s not only destroyed and destabilized one of the world's most industrialized and stable nations, but also propelled Adolf Hitler's ascent to power. Furthermore, Venezuela's monetary devastation is a more recent example of inflation, but this is a phenomenon that has happened 56 times since the end of the first world war, according to studies by S. Hanke and C. Bushnell (Hanke & Bushnell, 2016).

The difficulty with government-issued money is that its hardness is mostly determined by those in power's capacity to maintain its supply from increasing. Only political limits give hardness, and the government's ability to issue money is not limited by physical, economic, or natural restraints. Rai stones, silver, gold, and seashells all demand substantial work and can never be produced in large amounts, but government money just requires the government's fiat. The constant rise in supply assures that the currency is constantly depreciated, expropriating the owner's wealth to benefit those who produce the currency and those who get it first. This phenomenon is also known as the "Cantillon effect", which is

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named Richard Cantillon. Cantillon contends that the first beneficiaries of additional money who are able to invest it before it causes price increases gain from the expansion of the money supply. Whoever receives it from the source can then spend it, although with a slight price rise. As the spending increases, so does the price level causing later beneficiaries to lose actual buying power (Bordo, 1983).

For a variety of reasons, government money is the predominant form of money in modern times. First, it is required that taxes be paid in the government's own currency, which means that people are more likely to accept the taxation of money, making it a competitive advantage in terms of salability. Second, because the government controls and regulates the financial system, banks may only create accounts and deal in government-issued money, providing government money significantly more salability than any other viable rival. Third, many nations' legal tender regulations make accepting payment in other forms of money unlawful. Fourth, all money the government has is still backed by gold, either directly or indirectly. According to World Gold Council data, the gold holdings of central banks grew quickly in the early twentieth century as the government took their peoples and banks gold holdings. As the money supply increase in the late 1960s, the Bretton Woods system strained. Governments started to offload some of their gold reserves. The Bretton Woods System, which was formed in the 1940s, is a system of unified rules and regulations which provides a framework in order to establish fixed international exchange rates. The framework essentially gave mandate to IMF to handle and decide the exchange rates for all currencies in the world. The Bretton Woods System effectively ended in the early 1970s when President Richard M. Nixon declared that the United States would no longer swap gold for US money (U.S. Department of State, 2021). However, in 2008, this trend reversed, and central banks resumed their purchases of gold, boosting world supplies. One can claim that during the period of government money, in their official deposits, governments have a far larger number of gold than during the 1871–1914 international gold standard (World Gold Council, 2021).

Consider person A borrowing salt from person B to better understand debt, credit, and the significance of redemption. To repay person B, person A goes to the shop, buys salt, and delivers it to person B. Not only is person B repaid; the debt is extinguished. Borrowing money used to be like borrowing salt. The settlement of debt in gold-backed dollars settled the loan and extinguished the debt. However, when the Bretton Woods Agreement expired and Nixon decoupled the dollar from gold by forcing Americans to pay with paper dollars exclusively, each debt was transferred rather than cleared. Gold still possesses an important monetary role in which its value is not an obligation to another. It is however limited to

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central banks while individuals are instructed to utilize government money (U.S. Department of State, 2021).

As technology improved to allow for more complex forms of currency, such as for example paper money, new hurdles surrounding its salability emerged. There is a possibility of third-party intrusion when an individual wants to use his/her paper money. This is not an issue for commodity money, the price of which is defined by the market and cannot be chosen by third parties to the transaction: beef, gold, and silver all have a market and eager clients (Selgin, 2015). The salability of government-issued money with minimal commodity value, on the other hand, might be jeopardized if the governments that produced it proclaim it unfit for legal currency. According to Selgin (2015), the drawback of fiat money in comparison to commodity money stems from the reality that its scarcity, which is therefore contrived, is also contingent: it is a matter of careful policy, and it is subject to adjustment at the choice of the monetary authorities or—if those authorities are bound by a monetary law—at the discretion of the legislature. As a result, although a fiat currency can be managed to not only maintain its purchasing power over time but also to obtain the highest possible degree of overall macroeconomic stability, there is no assurance that it will be managed in this manner, and market forces (as opposed to political forces) have no effective check against its arbitrary mismanagement (Selgin, 2015).

### 2.5. Money and Time Preference

According to Salerno (2010), sound money is selected on the premiss that it keeps its value over time because it can be managed into smaller and larger scales. It's money where the supply cannot be controlled by someone or something that could force anyone to use it. On the basis of the prior discussion and interpretation in Austrian economics, the role of sound money can be shown in three main ways: it first protects value over time, allowing individuals to think more about their future and to decrease their preference for time. The ratio of individuals to the present and the future is hence called time preference. Reduction in time is what begins the human society process and encourages people to collaborate and to succeed. Second, sound money enables commerce to be built on a stable unit of measurement—allocating governmental control and coercion to more general economies—and free trade can result in stability and prosperity. Furthermore, the functions of a unit of account are needed in order to conduct economic measurements and plan ahead, which unsound money cannot generate. To conclude, sound money is essential in order to achieve

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human freedom from despotism and regression since a coercive state's ability to create money will give it excessive control over its subjects. Furthermore, sound money is a major factor in deciding individual time preferences and is a significant and often overlooked part of individual decision-making (Hoppe, 2001; Salerno, 2010).

The decline in moneys buying power corresponds to a type of taxation or expropriation where the actual worth of the money is reduced at the same time as the constant nominal value stays the same. Government money is integrally linked to man-made reduced interest rates in contemporary economies, a favorable outcome since this favors borrowing and expenditure. Lowering interest rates reduces the cost of borrowing money. This increases consumer and corporate spending and investment, and it has the potential to raise asset prices. However, the consequence of this capital manipulation pricing is that interest rates for investors, savers and borrowers should be artificially reduced. A reduction in savings and an increase in loans are the logical consequences of this scenario. On the margins, people spend more and borrow more from the future. This will affect not just your preferences in financial decisions, but also most probably everything else in your life. It will have ramifications (Hoppe, 2001; Rothbard, 2011).

The transition from money that either holds or appreciates money is important in the long term where society saves less, gains less capital and may start consuming capital while the productivity of workers remains constant or declines, leading to actual wage stagnation (Böhm-Bawerk, 2017).

### 2.5.1. Monetary inflation

Money's function as a medium of exchange, store of value, and unit of account—in contrast to all other commodities—is entirely orthogonal to its quantity. The purchasing power of money— not the size of money — is the important thing, and therefore any money is enough for monetary functions, provided that it is divisible and groupable sufficiently for the demands of owners of transactions and storage. A money supply of any size could support any number of economic transactions as long as the currency is sufficiently divisible. Ideal money theoretically would be set, such that nobody could make more of it. Such a society would be the sole non-criminal means to earn money by creating and exchanging things for money for others. Everyone strives to have more money by working more and thus producing more, boosting the material well-being of everybody and enabling them to build up more

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capital and boost productivity. If others were not allowed to extend the money supply, then money would be a good value store, but the income it held would not be depreciated over time, which would incentivize people to save and plan for the future (Böhm-Bawerk, 2017).

The monetary history mentioned above shows that it is difficult to construct a kind of money that cannot be generated any longer. Everything chosen as an exchange medium will be of value over time and will result in more people wanting to generate more of it. In contrast with the available stock, the biggest sort of money in history has made the fresh supply of funds at least important and its creation unprofitable. Gold is indestructible, which is the only commodity that has only risen in inventory since it was mined by the first people. Thus, gold is linked to sound money: money whose supply is guaranteed to never rise appreciably by the rules of physics and chemistry. For thousands of years, people have sought to find better type of sound money than gold, which is why it was the principal financial tool of the majority of human societies throughout history. Even when government money is transformed into value, a medium of exchange and a unit of account, governments continue to retain a substantial fraction of their gold stock, which represents a substantial share of the total gold supply (World Gold Council, 2021).

If new supplies are insignificant as compared to current supplies, people's readiness to spend money and incentive to spend it define its market worth. Such elements may substantially alter over time for individuals, as their personal circumstances vary from retaining big sums of money to holding durations that are lower. Since nevertheless, money is a good market for the least decreasing usefulness, the individual situations in society as a whole might be slightly different. The law on the diminution of marginal use is therefore a fundamental economic law that asserts that the accumulation of more goods will reduce the marginal usefulness of each additional unit (Marshall, 1997).

Since there is progressive reduction in the marginal value of retaining money, the demand for money does not alter dramatically. As paired with an almost constant supply, the value for money in products and services is generally consistent. It is therefore doubtful that the money would be much appreciated or depreciated, making it a bad investment, but an excellent value store. An investment should have considerable appreciation potential, but it also poses a major danger of loss or depreciation where the investment can have a negative return. Investments generate return on risk taken which low risk currencies do not offer. In all, the need for money would probably fluctuate simply with temporal variation. More individuals are likely to opt to save money as a result of developing lesser time preferences than other commodities and services, therefore enabling their market worth to expand further

in contrast to their owners. On the other hand, a society which acquires a higher time preference tends to diminish its holdings of money and to somewhat lower its market value. The holding of money would remain, in any case, the least dangerous and most profitable asset, which is at the basis of demand (Böhm-Bawerk, 2017; Rothbard, 2011; Hoppe, 2001).

It is important to note that an assessment of a monetary medium which is completely stable is neither theoretically viable or can be determined. The commodities and services that money may purchase will develop throughout time with new technology that replaces older items and with fluctuating supply and demand of different products. One of the main responsibilities of a monetary unit is to function as an economic unit of measurement whose value continually varies. The price of a monetary commodity is consequently difficult to exactly assess, however studies like Jastram (2009) may show an overall trend towards maintaining its worth for a medium of exchange, particularly in relation to other currencies, over a very long time (Jastram, 2009).

U.S. data, concentrating on the previous two decades—which experienced economic expansion quicker than Jastram's timeline—reveal that the value of gold for commodities is increasing, whose values in US dollars have substantially risen. Gold is the hardest money accessible. This is constant since the supply of gold is more expensive than commodities. Over time, the buying capacity of gold will increase since all other commodities will be more abundant. The U.S. dollar was linked to gold however, with the US civil war and the manufacture of greenbacks, the devaluation of dollars and confiscating citizen gold in 1944, it gained value over commodities but lost significantly worth (U.S. Department of Commerce, 1970).

When we compare the costs of services and goods to the value of gold and government money, we find that their prices in government money have risen significantly, while their prices in gold have remained comparatively stable. For example, since 1971 the price of a barrel of oil, one of contemporary industrial societies' most significant commodities, has stayed comparatively consistent with gold, although the size of government currencies increased in many orders (See Figure 4).

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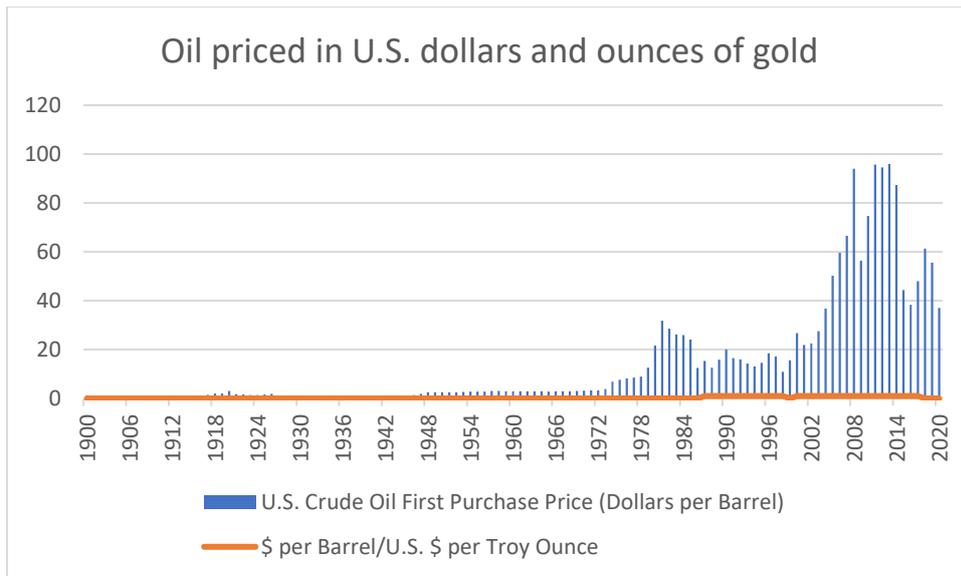


Figure 4 Oil Priced in U.S. Dollars and Ounces of Gold, 1900–2020 (Federal Reserve Bank of St. Louis, 2021; World Gold Council, 2021)

Hard money, the supply of which cannot readily be raised, is likely not to be easy since its supply is basically inescapable, but society's demands for money fluctuate over time depending on changes in temporal preferences. Easy money, by contrast, generates widespread fluctuation in holders' desire, as the amount swings and their durability as a value store decreases and grows because of the capacity of their manufacturers to fluctuate significantly (Salerno, 2010).

Such relative value stability is not only vital to preserve the buying power of the savings of holders but also the integrity of the monetary unit as an accounting unit. In the case when the value of money is predictable because of small fluctuations in supply and demand, it may be a clear warning that other products and services' prices will fluctuate. In the case of the government cash instead, the supply of the cash grows as supplies and contracts grow via deflationary recessions and bankruptcies of the central bank and of business banks, and demand for cash varies yet further unexpectedly in terms of policies set by the central bank as well as expectations of the people. The long-term value of government money is unknown due to this extremely variable composition. Central banks' mandate to preserve price stability demands that they actively regulate their currency supplies through their various instruments, which appear to make certain major currencies less volatile than gold in the near term. However, in comparison to the consistent, progressive growth in gold, the steady growth in the quantity of government money makes the value of gold more predictable in the long term (Szabo, 2002).

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Sound currency, chosen for its probability of a value over time in a free market, would inevitably be more consistent than unsound currency, whose usage is forced by the government. If the government's currency is a better unit for the accounts and the cash store, government legislation on tenders would not be necessary to implement it, or governments all over the world would have to seize huge sums of gold so that they can remain in their central bank stocks. It shows their long-term confidence in their own currencies when banks continue to hold or increase its holdings of gold (Salerno, 2010).

### 2.5.2. Saving rates

One of the biggest problems created by decreasing currency values is that savings for the future are discouraged. Time preferences are uniformly positive: most individuals are going to select for the same good today or in the future. Only by raising future returns do people defer satisfaction consideration. Sound currency is money which improves its worth over time, meaning that it can grow purchasing power. Unsound currency, governed by central banks that have the principal objective of keeping inflation positive, will not be encouraged to keep it, since it is more likely to be spent or borrowed. In terms of investments, sound money produces an economic climate in which every good return rate benefits the investor, and if not appreciated, the monetary unit will retain its worth, reinforce the motivation to make investments. Only returns higher than the depreciation rate for unsound currency will be realistically useful and offer incentives for high-return yet high-risk investment and consumption. In addition, since rising the amount of money mostly means lower interest rates, saving and investing would drop while borrowing motivation grows (Salerno, 2010; Marshall, 1997).

Saving rates have been falling across developing economies, resulting in low rates where national, local as well as personal debts have risen to levels never seen before, as seen in Figure 5. Almost all Western economies have seen their savings rates fall into the single digits, and in some cases down to negative levels. The average savings rate in five of the five major economies—those are France, United Kingdom, Germany, Japan and the United States—was 14.25% in 1970 but has since fallen to 4.17% in 2019, a nearly 75% decline (OECD, 2021).

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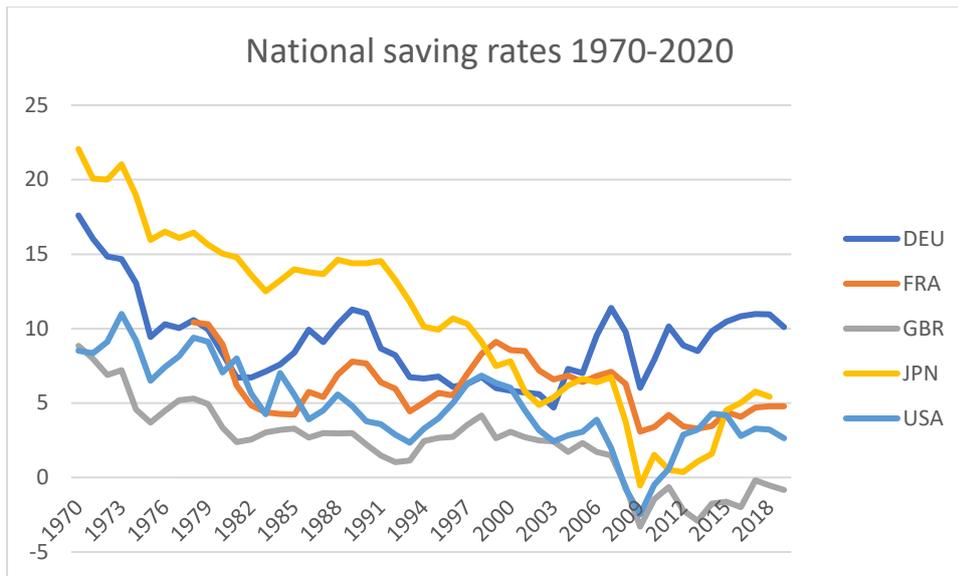


Figure 5 National Saving Rates in Major Economies, 1970–2020 in % (OECD, 2021)

### 2.5.3. Interest rates and loanable funds

In a contemporary economy, capital markets consist of loanable money markets. When the manufacturing structure is more sophisticated and longer-term, consumers no longer directly invest their money, but instead lend it to companies specialized in the creation of different institutions. The rate of interest is the price the loan is paid to lend its money and the price the loaner pays. The quantity of these funds given in a free market for loanable money grows as the interest rates climb, like all the supply curves. In other words, the greater the interest rate, the bigger the chances for employers and companies to save money. On the other hand, loan demand is adversely connected with interest rates, which indicates that for example firms tend to borrow less when the interest rates increase. In a free capital market, the interest rate is positive, and people consider time preferences. A country with a high number of individuals who wish to save money is more likely to have a low interest rate and a significant quantity of capital available for firms to invest in, resulting in future economic progress. This is however not how the capital markets works because of the ability of the central banks to set the interest rates and therefore control the availability of capital. The central bank's primary instruments are as follows: Establish a federal fund rate, establish the reserve needed ratio, carry out open market activities and identify standards for lending eligibility (Böhm-Bawerk, 2017).

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The current financial system's essential concept is that banks produce money if they take part in lending. Banks not only loan their clients' savings but also their demand deposits under a fractional reserve banking system, such as the one now in operation. This means that, even if most of it has been given to a borrower, the depositor has the right to withdraw the money at any moment. The bank generates new money indirectly by loans it to the borrower and keeps it at the depositor's disposal. This increases money supplies. This is why money supply and interest rates are related: as interest rates decrease, loans increase and money creation increases and the cash supply grows. This is the basis of the relationship. The increase in interest rates, on the other hand, causes the loan to be lowered and the monetary supply to decrease or at least its growth rate to decrease (Böhm-Bawerk, 2017).

Savings would delay consumption to save in a free market system with a solid capital. Money stored in a bank would be money withheld from consumption by people who are postponing the reward that consuming may bring to additional reward in the future. The exact amount of loanable money accessible to producers for loaning would become the exact number of deposits. The availability of capital goods could be linked to a decline of physical resources, consumption, labor etc. Scarcity is the primary starting point for all economics and the main consequences are the cost of any economic action. Capital opportunities in the capital market are forgone consumer, and consumer opportunities are forgone investment. This enables for the utilization of lengthy and more efficient production processes with a reduced interest rate (Böhm-Bawerk, 2017; Graf, 2013).

The central bank will unavoidably be at variance between savings and loanable funds as it handles the supply of money and the interest rates. Central banks normally try to boost economic development and investment, so increasing the supply of money and reducing interest rates, so increasing a higher number of loanable funds than savings. Companies take over more loans than savers to initiate projects and finance such investments at artificially cheap rates of interest. The value of the cash borrowed is therefore greater than the value of the postponed consumption. There would have to be less money available for investors, without sufficiently delayed consumption to make up for lack of savings by creating new papers and digital entries on the paper does not raise the actual stocks of cash in society, simply devalues the current supply of money and distorts pricing. The lack of capital is therefore not easily detected since both central and regular banks can produce money in order to stimulate demands, which is the worst downside of unsound currency. The manipulation of the price of capital is impossible in an economy of solid money: if the interest rate is set too poorly, a decline in capital availability for borrowers is a reflection of the shortage of savings

## Is Bitcoin Money?

at banks which could result in an increase of the interest rates. This can in turn decrease the demand for loans until demand and supply meet. Unsound currency only permits this kind of manipulation for a short period of time (Hayek, 1989; Böhm-Bawerk, 2017).

### 3. The Development and Future Case of Bitcoin

The first programmable computer was made in the 1950's which brought whole new aspects to life. While the use of computer and network technologies for payments and recordkeeping is rising in both banks and startups, successful inventions have not given us additional money and inventions have failed. BTC is the first really digital answer to the issue of money and a possible answer to salary, healthiness and sovereignty issues exists. Over the past 10 years, the BTC has worked nearly without fail. If it operates similarly in the next 90 years, it will provide a convincing answer to the problem of money, allowing the person a sovereignty over money, which resists unanticipated inflation and is also extremely rewarding over space, scale and time (Graf, 2013).

This section will focus on BTC's monetary features as well as the networks' economical performance since its beginning in 2009 in order to explain why BTC provides a new technology solution to the cash issue. In the next section, the technical information on BTC network functioning will not be excessively detailed, rather it will be focused on its monetary properties.

#### 3.1. Bitcoin's characteristics

It is useful to look at the world before BTC was established to appreciate the relevance of a technology for digital cash when payment methods could be divided into two different non-overlapping categories: cash and intermediated payments. Between two parties, cash payments are made in person. These payments are instant and final and do not need the confidence of any of the contracting parties. This means that no third party can interfere with such payments. Their biggest downside is that both parties are physical in the same location, which is becoming more evident as telecommunications makes it more possible for people who are not in their local neighborhood to desire to deal with. The second kind of intermediary payment are for example credit and debit cards, bank wire transfers, PayPal etc. need a trusted third party. Intermediated payment includes, by definition, a third party overseeing the transfer of money between the two parties. Intermediated payment includes, by definition require a third part to monitor the transaction of money between parties. Its key negatives are the confidence needed to carry out the transaction, the danger of compromise

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for a third party and the expenses and time required to finish and clean up payments to enable the receiver to spend the transaction (Graf, 2013; Szabo, 2002).

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The possibility of fraud which in the end causes delays and increase in the transaction costs. Thus, medium payments remove the limitation in regards to functioning as a medium of exchange since the owner can, due to high liquidity, exchange whenever he/she wants. Fungibility (any money unit equals any other unit) and liquidity are historically the most persistent characteristics of cash (which is the owners ability to quickly sell at the current market price). People desire fungible and liquid money because they demand sovereignty over currency. Sovereign currency includes all the permission to spend it: other people's willingness to hold money goes beyond others' ability to impose controls on it. While interim payments undermine certain desirable money characteristics, these deficiencies do not occur in physical transactions. But since over time there is an increase in trade as well as in employment, there are prohibitively no practical physical cash transactions. Before BTC, it reduced the level of sovereignty people had over their money and forced them to trust third parties without a choice. Furthermore, the move from gold to fiat currencies that are supplied from a central bank which is the only one who can produce further reduced peoples control over their money as central banks inflated the financial provision of government financing, as well as the landslide in value of their money. Capital and wealth without the government's permission to spend this money became increasingly unpractical (Szabo, 2002).

## Is Bitcoin Money?

Satoshi Nakamoto's BTC motivation was to create an "electronic cash form purely peer to peer," which would not require confidence in third parties in transactions and which could not alter the supply of any other party" (Nakamoto, 2009). That means that the BTC will bring the beneficial characteristics of physical funds (absence of middlemen, purpose of transactions) into the online world where they will be combined with a monetary system which cannot be manipulated to cause unpredictable inflation at the expense of owners to benefit an outside party. Nakamoto has succeeded by using a few significant technologies: hashing, digital signatures, proof of work and a decentralized peer-to-peer network (Nakamoto, 2009). The peer-to-peer network has equal privilege and obligations for each other in a network structure. No central coordinators are able to change the network rules Hashing is a procedure which may use a non-reversible mathematical formula to take any data stream as input and turn that data stream into a fixed size, which is known as a so called "hash". Hashing in essence allows the identification in public of a database without disclosure of the data which can be used to ensure that several parties have the same data in a secure and reliable manner (Nakamoto, 2009).

Page 37: By creating BTC on a very rigorous evidence and verification basis, Nakamoto has removed the requirement for faith in a third party. BTC's core function is verification, and because of that only BTC can eliminate totally the requirement for trust (Graf, 2013). Each transaction needs to be recorded by each network member to share a common balance- sheet and transaction leader. Whenever a member transfers an amount to another member, the sender's balance may be verified by all network members, and nodes are the first to upgrade the leader every 10 minutes, with a new trading block. To commit a node, it must spend power in processing complicated mathematical problems that are hard to solve, but the correct solution is easy to verify. Since the correct solution is easily verifiable by all network members, it serves as a proof of work (PoW). While these mathematical issues are not related to BTC transactions, they are of importance to the operation since it limits that fraudulent transactions are taken into account. Trying to transact fraudulently to the BTC leader means deliberately wasting the resources to solve the PoW just to see nodes almost at no expense rejecting it, thereby with having the mining company's block payout. Once a PoW is properly resolved and transactions are announced, there is a voting from the other nodes and if a majority is reached a new block is created. The node which completes a transaction block are then rewarded with a block fee consisting of the brand-new BTC and all transaction fees paid by transactors (Graf, 2013; Nakamoto, 2009; Piana, 2017).

## Is Bitcoin Money?

This is called mining—akin to gold mining—that is why nodes that solve PoW are called miners. This procedure is called the mining process. This payout for the blocks pays the miners for their resources. In BTC, the new money issued in a contemporary central bank flows exclusively to those that use the resources to update the Bureau. The new money flows to financing loans and government expenditure. The acquisition of government bonds is linked to central banks' unorthodox monetary policies. Conventional monetary policy instruments may not be sufficient in atypical periods to fulfill the central bank's purpose. Unconventional measures may generally be characterized as policies which aim banks, consumers and non-financial corporations directly at costs and access to external credit. These financing sources might be liquidity, loans, securities or equities in the form of central banks. One method that the central bank might effect credit costs is through the impact of asset market conditions at different maturities – for example, government bonds, corporate debt, business paper and overseas assets. It is possible to consider two different sorts of policies. The first attempts to alter, regardless of their risk, the level of the longer-term interest rate on all financial assets. Such a strategy would largely effect the risk-free asset market, mostly government bonds. This approach is usually referred to as quantitative easing. The second strategy involves affecting the risk spread across assets, particularly impaired and functioning markets. This type of strategy is commonly referred to as "credit easing." The makeup of the central bank's balance sheet is affected differently by the two types of policy. Monetary policy authorities (ie central banks) manage traditional money in a semi-automatic (or at least rules-based) and semi-discretionary manner. The protocol of a cryptocurrency is operated by a predefined algorithm, making its management completely automated (European Central Bank, 2021).

Nakamoto designed BTC to generate a new block about every 10 minutes, with each block containing fifty coins. This was the case during the first four years of operation, then halved to 25 coins, and further reduced every four years after that (Graf, 2013; Nakamoto, 2009). The amount of BTC generated is preprogrammed and cannot be changed regardless of how much work and energy is invested on PoW. This is accomplished using a method known as "difficulty adjustment," which is possibly the most clever feature of BTC's architecture. As more individuals opt to keep BTC resulting in an increase in the value of BTC. Mining new BTC becomes more profitable, causing more miners to devote more resources on solving PoW difficulties. More miners mean more processing power, which means that PoW solutions come faster, boosting the rate of issuance of new BTC. However, as processing power increases, the underlying BTC network will increase the complexity of the

## Is Bitcoin Money?

mathematical puzzles required to unlock mining rewards, ensuring that blocks continue to take roughly 10 minutes to generate (Graf, 2013; Nakamoto, 2009).

Difficulties in adjustments are the hardest part when creating money and preventing the stock-to-flow model from growing. This type of fundamental issue does not exist in BTC. When the value of a currency rises, more resources are devoted to its manufacture, resulting in an increase in its supply, since if the average price level of any currency is high and products and services are expensive, customers will want more money. In contrast, when the value of BTC grows, greater work to manufacture BTC does not result in more BTC being produced. Instead, it simply increases the processing power required to submit legitimate transactions to the BTC network, increasing the security of the network. Increasing the value of BTC does not increase its supply, it only makes the whole network more secure. As the value of any other kind of money grows, those who can generate it begin to manufacture more of it, resulting in an increase in the overall level of prices. As a result, a unit of money essentially buys less than it did previously, a phenomenon known as inflation. Everyone has a motivation to generate more, whether it's gold, governmental money or seashells. The more difficult it is to respond to an increase in price by increasing the amount. This makes it more likely to be widely accepted and used since it benefits society on an overall level. It is no surprise that gold became the standard because it is so difficult to manufacture. The same properties can be found in BTC, which is also difficult to create. A rise in the value of gold will result in higher quantities being created in the long term. This however can not be said for BTC since its supply will stay constant. With a flexible mining difficulty, the network remains secure, completely independent of the number of miners and the hash rate that flows into the network. The algorithmic inflation rate—probably BTC's strongest value proposition—is also secured by the difficulty adjustment. Even in times of increasing demand for BTC, BTC miners have no way of mining BTC faster. This makes unexpected inflation impossible (Graf, 2013; Nakamoto, 2009)

### 3.2. Bitcoin Supply and Demand

The imbalance between the miner's cost of solving the PoW and the expense of validating the transaction's validity underpins BTC's security. Whereas mining BTCs requires vast amounts of energy and processing capacity for miners to record transactions, the miners' cost of validating the transaction is nearly \$0 and will stay at that level regardless of BTC's

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market rise. Miners cannot commit fraud on the Bitcoin ledger by trying to implement fraudulent transactions, because they would waste huge amounts of energy and cost for solving the PoW only to have the BTC nodes reject the fraudulent transactions at no cost, resulting in not getting compensated in the BTC reward (Nakamoto, 2009).

The ownership of BTC is allocated via pseudonymous public addresses. Ownership of the private key underpinning the address and comprised of characters similar to a password secures access to the owner's BTCs. Users must first download a BTC wallet, which is software that lets users to safely transfer, receive, and store BTC coins in the BTC network. A BTC address is a one-of-a-kind identification made up of 26–35 alphanumeric characters. The identity begins with the number 1 or 3, indicating a place where the cryptocurrency can be transmitted. The BTC user can generate a BTC address for free. The BTC address, on the other hand, is not permanent, and it may change with each subsequent transaction. BTC is not entirely anonymous; rather, it is pseudonymous, which means that each identity is linked to the fictitious name of each user's public address. Whereas the physical weight of Rai stones makes divisibility problematic, BTC does not have this issue. BTC has a maximum quantity of 21,000,000 coins, each of which is divided into 100,000,000 BTCs, also called satoshis in honor of Satoshi Nakamoto's pseudonym. This fixed quantity makes BTC extremely salable across scales. As discussed in section two, Rai stones were useful for a few transactions but BTC has significantly higher salability because the digital ledger is accessible through the internet worldwide (Bathia, 2021).

BTC's ledger is not maintained by a single authority, and no one can change record on the ledger without the approval of a majority of network users. The software that runs the various nodes in the network, rather than a central authority, determines the transaction's validity. Nakamoto was able to develop digital scarcity using this technical architecture. BTC is the first example of a digital item that is limited in supply and cannot be indefinitely replicated. Aside from digital scarcity, BTC's properties show absolute scarcity, because it is the only liquid digital commodity with a strict quantity of 21 million units. Scarcity was always relative, never absolute, prior to the birth of BTC. As a result, extreme scarcity refers to a situation in which there is insufficient of a resource to meet current demand. A common misconception is that physical items are completely scarce because the quantity limit of the items that can be created is never its abundance on the planet, but rather the work and time spent to generating it (Salerno, 2010). BTC offers scarcity and salability across long time horizons, an important aspect to understand, more discussed in the following sections in the context of BTC's properties as a store of value, BTC's inflation timetable, like its transaction

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record, is unchangeable. Providing supply growth was relatively strong in the initial few years of BTC's existence, as time passed, the supply growth rate decreased, and the network's trust in maintaining this supply schedule improved and continues to climb while no major modifications are made to the network (Graf, 2013; Nakamoto, 2009).

Every 10 minutes, BTC blocks are added to the shared ledger. The block reward was set to 50 BTC every block at the network's inception. The BTC reward for miners is reduced by half every four years after the issuing of 210,000 blocks, a process known as "halving". On November 28, 2012, the first halving occurred, following which the issuance of new BTC was reduced to 25 per block and in May 2020, it was reduced to 6.25 coins each block (see Figure 6). Based on this fixed block reward schedule (the halving events), the supply of BTC will grow at continuously slow rate, eventually nearing 21 million BTC in 2140 (Nakamoto, 2009; Baur & Dimpfl, 2021).

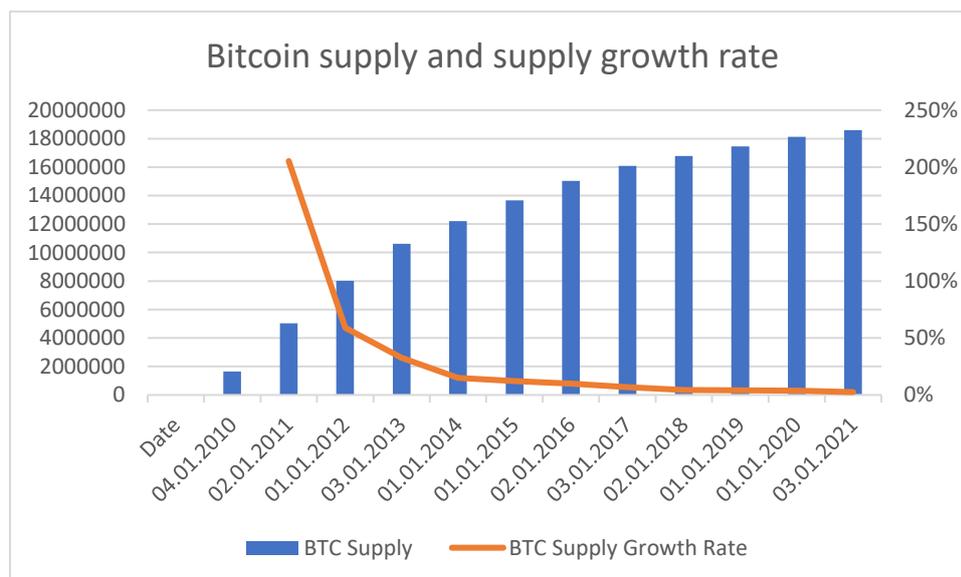


Figure 6 Bitcoin Supply and Annual Supply Growth Rate in %, 2009–2021 (Blockchain, 2021)

BTCs are created when new blocks are issued, and each new block requires to solve the difficulties of PoW. Moreover, there are costs associated with the creation of new BTCs. If the market value of BTC grows, additional nodes are issued to solve the difficulties of the PoW in order to get the BTC reward, which increases the difficulty adjustment of the PoW in the blockchain further, making it more expensive for the miners to receive the block reward. As a result, the cost of creating BTCs will often increase along with the rise in market prices. Satoshi Nakamoto split each BTC into 100,000,000 units, popularly known as satoshis, after establishing this supply increase timetable. However, because to the declining pace of

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growth, the first 20 million BTCs will be mined by about the year 2025, resulting in having 1 million BTCs left to mine for the next decades (Nakamoto, 2009; Bathia, 2021)

The before mentioned difficulty adjustment is not an accurate procedure, it is a standardization that corrects itself every two weeks and which, depending on how many new miners join the mining industry, may exaggerate or underline their aim, the quantity of new coins released is not exactly as anticipated by the algorithm. As supply increases, the deviation from predicted growth will reduce. BTCs amount of 21 million coins will not change the supply growth rate will continue to fall as a decreasing rate in BTCs are added to a rising stock BTCs (Nakamoto, 2009).

Data shows that at the start of 2021, 18.58 million BTCs were mined, representing 88.51% of all 21 million BTCs. In 2021, the annual supply growth was 2.50%, decreasing from 3.89% in 2020. Table 3 in den appendix exemplifies BTC's actual supply growth and its underlying growth rate. Since the numbers shown in Figure 7 are estimates, the real numbers could vary (Yahoo Finance, 2021).

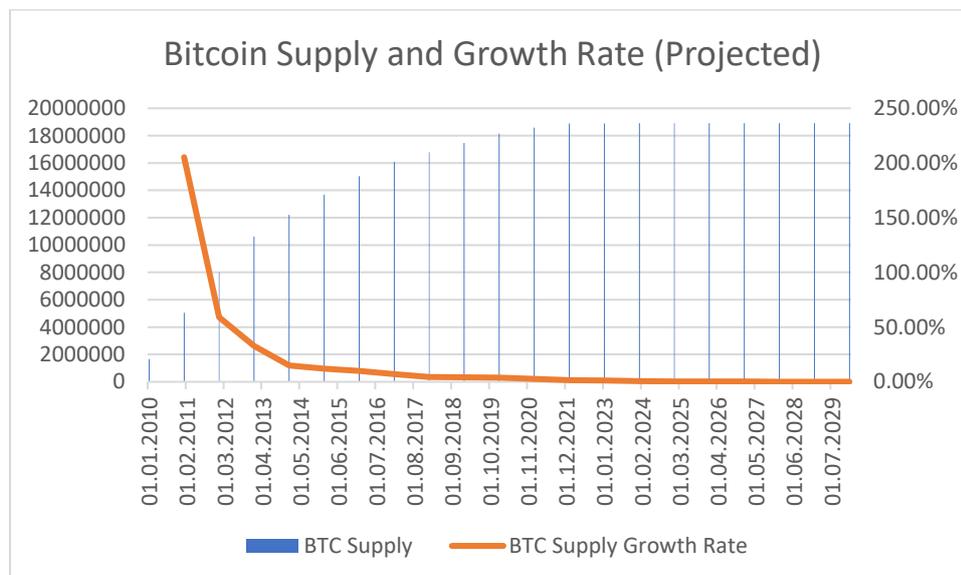
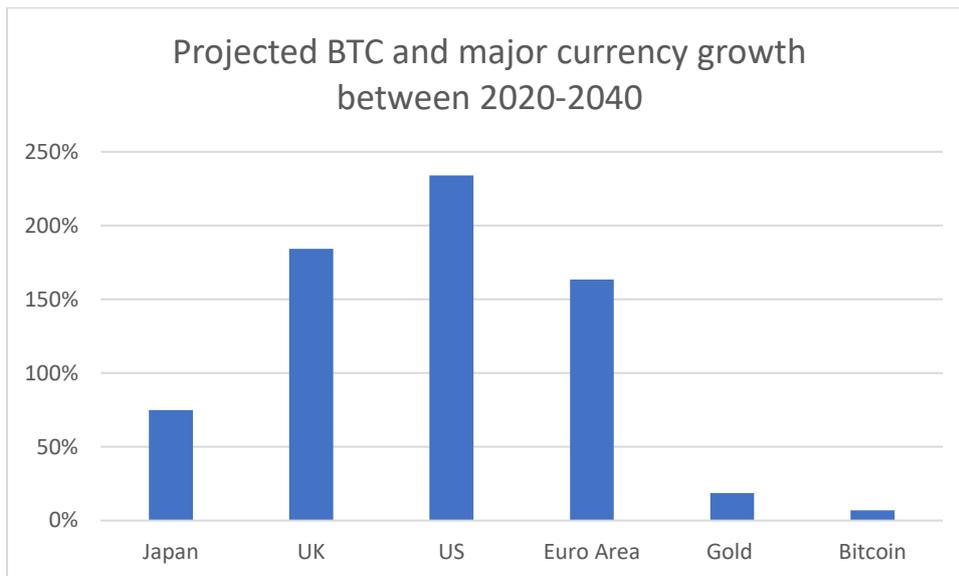


Figure 7 Projected Supply Growth Rate and Bitcoin Supply

Figure 8 forecasts the rate of expansion in the broad money supply and gold of the major global reserve currencies during 2020 and 2040 with BTCs supply increased by the calculated growth rates. The calculation exemplify that BTCs supply will rise by 7% in between 2020 and 2040, whereas gold's supply will rise by 19%, the Euro by 163%, the Japanese yen by 75%, the U.S. dollar by 234%, and the British pound by 184% (see Appendix table 4)



*Figure 8 Projected Bitcoin and National Currency Percentage Growth in Supply Between 2020 and 2040*

This elaboration can aid in understanding the utility of BTC its function as money. The supply growth of BTC will fall below that of gold in the upcoming years, resulting in BTC supply constraints that might lead to significant adoption as a store of value, showing the salability over the long-term. BTCs digital character and its divisibility into 100,000,000 smaller units, which allows it to be sent safely throughout the world, makes it salable across large distances and scale. Furthermore, BTC eliminates monetary control and confiscation by intermediary authorities which is a great advantage compared to the major flaws of government money. According to Mises' definition of money as a category of human action, anything is money when it is used as money—that is, as a medium of indirect exchange. The indirect exchange is a two-step procedure in which one exchanges products or services for a medium of exchange, generally money, and then swaps the medium of exchange gained for the desired products or services (Mises, 1981). Whereas traditional currencies are constantly rising in quantity and losing in buying power if the pace of income growth is lower than the rate of inflation, BTC has seen a huge rise in actual buying power, despite its constant increase in limited supply. Miners have a strong incentive to protect the network's integrity, because if they verify BTC transactions they are getting compensated in a small fraction of BTCs, this protection results in the currency's value to grow. (Graf, 2013; Nakamoto, 2009)

### 3.3. The Bitcoin Network

The BTC network was launched in January 2009 and was first used on a cryptography mailing list among a small community. One of the first milestones in the beginning of BTC was when the network run so smoothly that it got accepted by more and more individuals ready to integrate real money to acquire some of BTC units. This process led to BTC properties having a real market value instead of being economically worthless. This occurred in October 2009, when an online exchange known as New Liberty Standard sold BTC for \$0.000994. The first real-world purchase using BTC occurred in May 2010, when someone bought 10,000 BTC for two pizza slices for \$25, placing the price of BTC at \$0.0025. As more individuals learned about BTC and grew interested in acquiring it, the price continued to grow (Popper, 2016). The fact that the tokens were rigorously restricted and could not be copied contributed to the network's early collectable status. Following the purchase of BTC by a large number of persons and storage in the BTC network, it started to commercialize and accrue economic growth. According to Ludwig von Mises' regression theory on the origins of money, monetary commodity originates as a market item and is then used as a medium of exchange (Mises, 1981). BTC's value within the network is comparable to the worth of previous discussed primitive money like Rai stones or metals like gold.

BTC's price has changed drastically as demand changes, but the inability of any authority to increase supply arbitrarily in reaction to price increases explains the currency's rapid ascent in purchasing power. When there is a surge in demand for BTC, miners are unable to boost output beyond the predetermined schedule. The market can meet the rising demand if the prices increase which leads to BTC holders to sell BTC to new buyers. This trend is exemplified in figure 9 showing the price of a BTC has increased from \$0.000994 in October, 2009, to \$10,804 on October, 2020, an increase of 1,086,921,429 percent in 11 years (Coindesk, 2021).

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Figure 9 Bitcoin price in U.S. dollars (Coindesk, 2021)

People must retain Bitcoin as a store of value rather than simply spending it for the price to increase. Thus, BTC owners need to hold the digital currency instead of selling it on a daily basis just because of price swings, as is the case right now, Selling BTC on a continues basis will keep its market value low and counteract the price to rise. When looking at the current market value of BTC, in April 2021, all BTC in circulation were at around 1\$ trillion dollars making it worth more than the broad money supply of most nations' national currencies (CoinMarketCap, 2021).

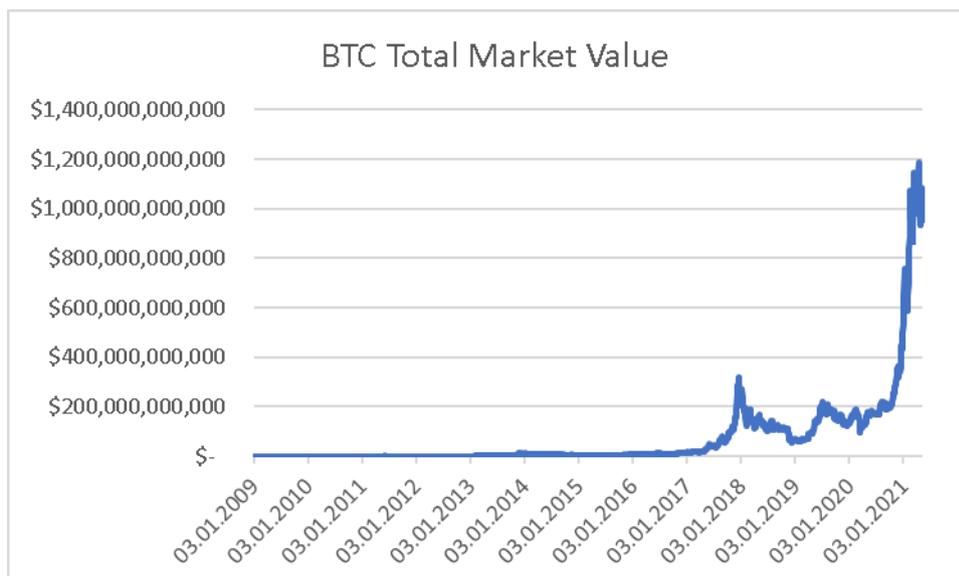


Figure 10 Bitcoin Total Market Value in U.S. Dollars (Blockchain, 2021)

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The underlying conservation monetary policy as well as the difficult adjustment helped BTC's success as digital cash, without these attributes, BTC would have been too insecure to be widely accepted by the market. If a new hard money competitor to Bitcoin arises, the policy would lead to an increase of the cost for the production of new units and the maintenance of the underlying ledger. The relative high expenses of maintaining the ledger would incentivize BTC miners to not cheat with their updates on the ledger. Thus, BTC network usefulness for its owners is interrelated to the increase in costs of the underlying ledger. Over the last five years, BTC network usage has increased dramatically: As figure 11 and Table 1 in the Appendix exemplifies, in 2009, 10,444 transactions were done at a daily average rate of 89 transfers, the number increased in 2020 to more than 37 million BTC transfers at an average daily rate of 305,841 transfers (Blockchain, 2021).

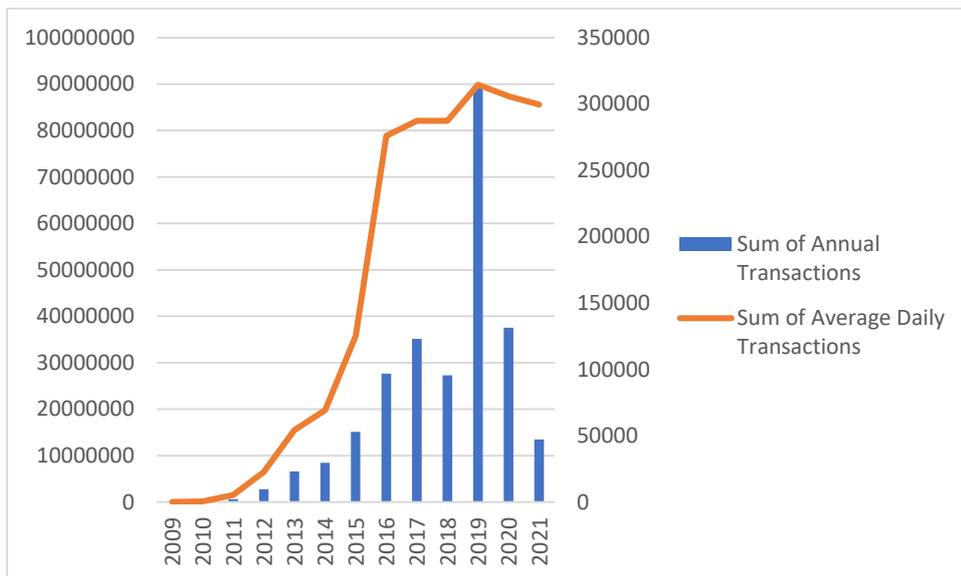


Figure 11 Number of Annual and Average Daily Transactions on the bitcoin network, 2009–2021

The number of people receiving funds in a transaction is specified as a payment. The number of daily verified payments, like the number of confirmed transactions each day, emphasizes the significance BTC's network as a mechanism to transfer cash safely without the involvement of an intermediary (Blockchain, 2021). Figure 12 depicts the yearly payments of BTC transactions from 2017 to 2021.

## Is Bitcoin Money?

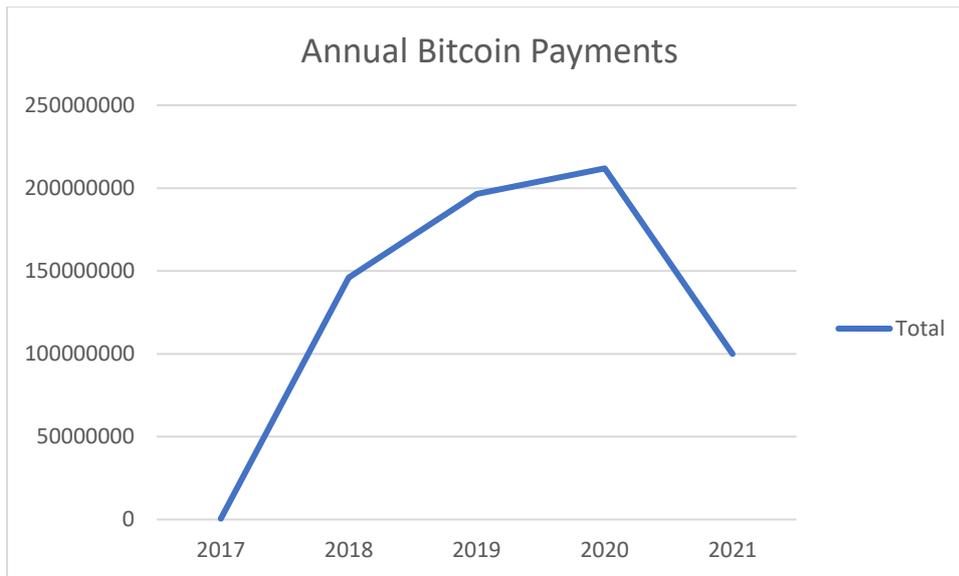


Figure 12 Annual Payments in Bitcoin, 2017–2021 (Blockchain, 2021)

The growth in BTC payment transactions were steadily increasing until 2020 however, this does not imply an increase in the stock value of BTC, as evidenced by the fact that the number of payments is significantly lower compared to an economy with a currency of equal value than that of the BTC supply. Furthermore, with BTC blocks now restricted to 1 megabyte in size, 500,000 transactions per day are near to the top maximum that the BTC network can perform and record for all peers on the network. Despite the fact that this limit has been reached and its presence has been widely disclosed, the increase in the BTC's value and the amount of day-to-day transfers did not decrease. Therefore, BTC owners might consider the digital currency more as a store of value and not a medium of exchange.

The market value of transactions has also risen through the course of the BTC network. Because of the odd structure of BTC transactions, it is difficult to properly determine the exact volume of transfers in BTC or US dollars. As data reveals, an average daily volume of roughly 260,000 BTC can be seen in 2017, also showing a high degree of volatility throughout BTC's lifetime. Compared to the growth of the market value in the US dollars, BTC's value of transfers did not grow significantly. In 2015, the total volume of transactions was \$9.803 billion US dollars. Since its inception in 2009, BTC has managed about one trillion US dollars in monetary transfers, with the US dollar value determined by the moment of the transaction happening, as shown in Table 2 in the Appendix and Figure 13.

## Is Bitcoin Money?

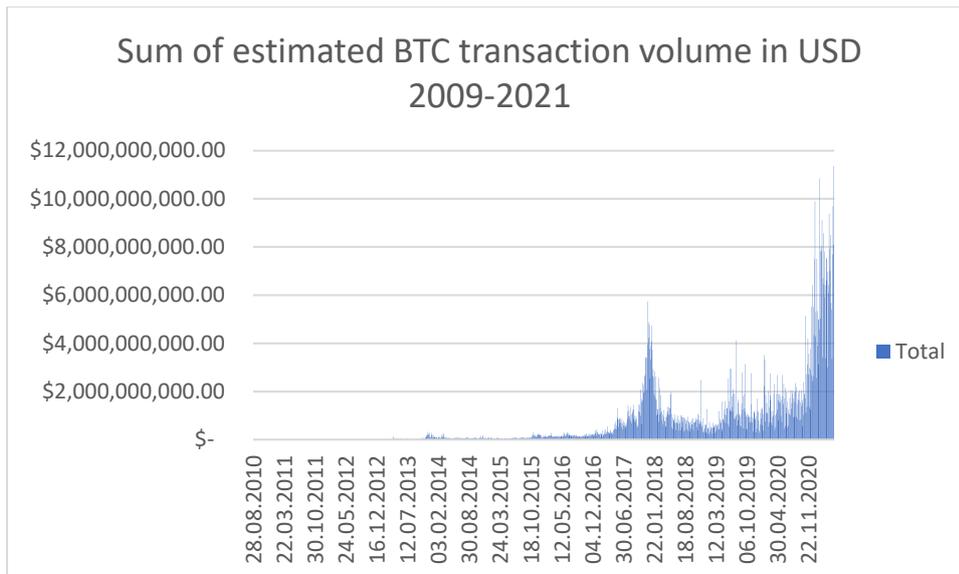


Figure 13 Total Annual U.S. Dollar Value of all Bitcoin Network Transactions (Blockchain, 2021)

The value of transaction fees required to conduct transactions is another indicator of the BTC network's development. When the number of transactions was modest in the beginning, miners would execute transactions without a fee since the block subsidy of new coins was worth the work. Miners could afford to prioritize BTC transactions with higher fees as demand for BTC transactions increased. Fees were less than \$0.1 per transaction until late 2015, when they began to rise beyond \$1 per transaction in early 2016. Because of the rapid growth in the price of Bitcoin in 2017, by the end of November of that year, the average daily transaction cost had risen to \$7, and \$2.50 by the end of 2020 (Figure 14).

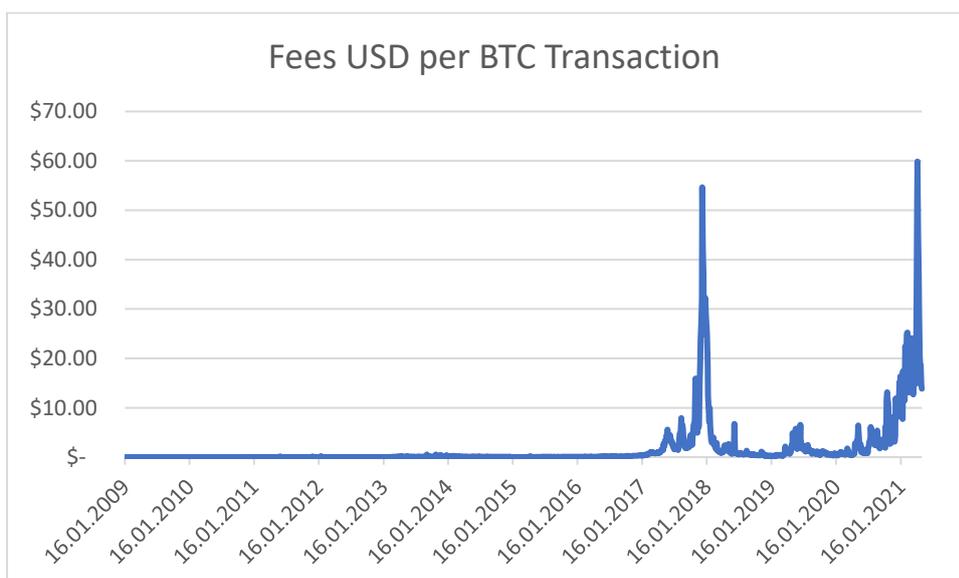


Figure 14 Transaction Fees in U.S. Dollars Between 2009 and 2021 (Blockchain, 2021)

## Is Bitcoin Money?

Throughout BTC's existence the price increased constantly with an underlying highly volatile market (Baur & Dimpfl, 2021). Bauer and Dimpfl argue that the high volatility of BTC makes it prohibitively costly to use as a medium of exchange and unit of account over short time periods. Figure 15 exemplifies the monthly standard deviation of market return during January 2020 of BTC and USD volatility. The estimates are based on data from the Federal Reserve Bank of St. Louis and BTC data from coindesk.com. While BTC's volatility looks to be decreasing, it remains highly high in comparison to the USD. Therefore, we cannot predict if the trend will continue to fall (Blockchain, 2021).

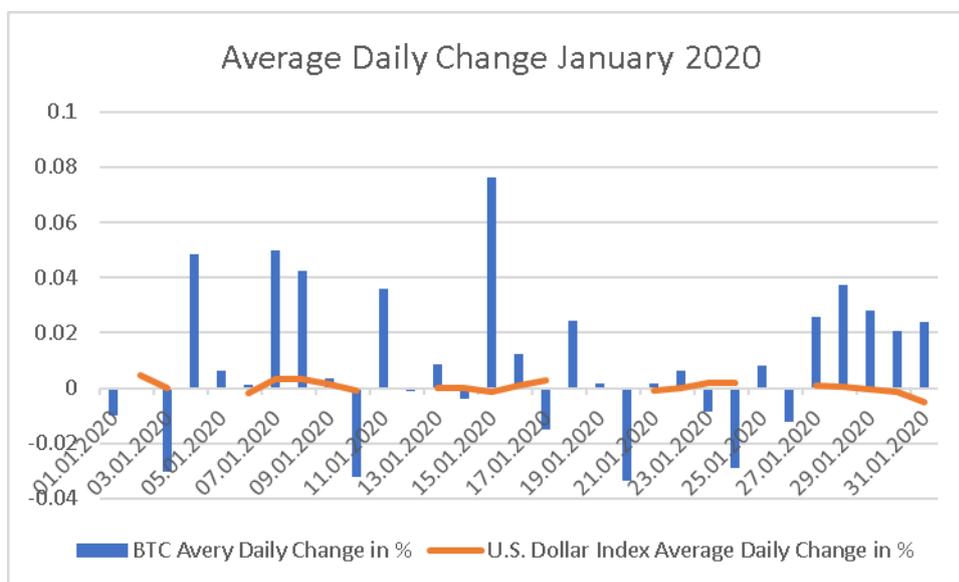


Figure 15 Average Monthly Volatility for U.S. Dollars and Bitcoin in January 2020 (Yahoo Finance, 2021; Federal Reserve Bank of St. Louis, 2021)

When examining price data for major currencies, BTC and gold, reveals a significant disparity in the volatility of these currencies' prices on a monthly basis. For the past six years, daily returns on gold, major currencies, and BTC were gathered. All currency prices are measured in USD. The USD Index was taken into account to represent the US dollar National currency data came from the St. Louis Federal Reserve, gold data was assessed from the World Gold Council, and BTC data was gathered from Finance.yahoo.com. Table 1 shows that the standard deviation of the major national currencies was more than eight times greater than that of BTC between January 1, 2015 and January 1, 2021.

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Row Labels	Sum of Average Daily % Change	Sum of Standard Deviation	Sum of Multiple Difference	Sum of Average Differenc Multiple to BTC
British Pound	-6.3956E-05	0.006255557	6.294091944	
BTC	0.002859642	0.039373052		
Chinese Yuan	2.99312E-05	0.002454649	16.04019458	
EURO	2.63086E-05	0.005132551	7.671244092	
Gold	0.000324881	0.008805928	4.471198306	
Indian Rupees	0.000102487	0.003557515	11.06757169	
Japanese Yen	-8.68959E-05	0.005452803	7.220699291	
Swiss Francs	-6.60829E-05	0.006026427	6.53339909	8.544324853
USD	1.05351E-06	0.004347635	9.056199832	

*Table 1 Average Daily Percentage Change and Standard Deviation in the Market Price of Gold, Major National Currencies per USD Between January 1, 2015, and January 1, 2021*

The volatility of BTC arises through its completely inflexible supply which does not respond to fluctuations in demand since its underlying program is set to grow at a fixed rate (Nakamoto, 2009). Commodity producers base their production decisions on the volatility of the underlying commodity's demand. A surge of the commodity's demand will cause the producer to increase the commodity's production. This leads to an increase in prices, enabling the commodity's producer to achieve more profitability. On the other hand, a fall in demand causes the commodity's producer to lower the commodity's supply which allows the producers to limit further losses (Graf, 2013). National currencies show similarities to commodity production behavior, only that central banks are required to keep their currencies' buying power relatively stable by regulating the money based on their monetary policy to strike against market volatility. BTC volatility can be explained through its unresponsive supply schedule to demand and through no central bank governing and controlling the supply. Especially in BTC early years, when market demand changes unpredictably on a daily basis and the financial markets just beginning dealing with BTC, volatility will play a major role (Graf, 2013).

However, we believe that as the market expands in size, so does the complexity and increase of knowledge by the financial markets dealing with BTC, so that volatility will likely decrease. An increased liquid BTC market will result in smaller daily changes in demand. A rise in the liquidity of BTC can only be achieved if a large number of individuals holding BTC for the long term, resulting in an increase of BTC market value with a strict supply. If the network ever reaches an acceptable size, the movement of BTC transfers in and out of the blockchain could end in an equilibrium, and the price of BTC may settle. This would lead to BTC acquire greater stability and even more acceptance among markets while also providing enough liquidity without continuously volatility in response to daily market transfers. However, as BTC's acceptance grows, its appreciation draws additional adopters, resulting to greater appreciation and pushing this decline in volatility farther into the future.

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As long as BTC's market value is increasing, its price will react similarly to that of an initial public offering (IPO) stock. If BTC's growth stabilizes, it could become a monetary asset like the major currencies, anticipated to rise in market value from year to year.

## 4. Methodology

Initially, our approach, research methodology, and design are described followed by a detailed description of our interviewees as well as the conducted interviews. Following is a description of our selection of secondary data that are used in the report. The chapter ends with a discussion around validity, reliability, objectivity, and information evaluation.

### 4.1. Approach, Research Methodology, and Design

In different parts of this thesis, we use both deductive and inductive approaches while writing. A deductive approach draws conclusions based on already existing knowledge to explain reality. This approach is used for example while constructing the interview format where some of the questions that were asked were based on already existing theories. An inductive approach, in contrast, draws conclusions from the findings in order to explain certain theories. This approach is, for example, used when either confirming or denying our research questions (Bryman & Bell, 2015).

This study has been conducted using qualitative and quantitative methodology where the qualitative approach focuses on soft data, of which perceptions and feelings are examples. We gathered the interview findings through interviews with four different interviewees. A qualitative approach instead focuses on measurable data, which we gathered through an extensive literature review. A mix of qualitative and quantitative methodology was needed in order to complement both the interview findings and the literature findings data with each other. The number of interviews needed to conduct quantitative research only were not feasible, and we thus needed to complement interviews with other relevant findings (Bryman & Bell, 2015). This could in theory cause problems when incorporating qualitative and quantitative methodology where the ability to integrate and analyze the findings could be hindered and therefore affect the quality of the report. There are obvious difficulties with integrating quantitative data with feelings and opinions we find in the interview findings. To combat this, however, we gave more focus toward quantitative and qualitative methodology to different parts of the research. This gives more emphasis on one of them even though both approaches are used (Morgan, 1998).

The design is based on a case study, which means that a specific case is analyzed in depth. This fits this thesis research question well where we analyze whether BTC could be

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seen as money or not (Bryman & Bell, 2015). Our choice of approach, research methodology, and design give this study the ability to, in a unique way, present and analyze whether BTC could be seen as money or not.

### 4.2. Interview Design and Interview Participants

#### 4.2.1. Interview design

To collect primary data, we conducted four interviews with different people working within different fields. All four interviews were semistructured, where a set of predetermined questions were selected on which the interviews were based (see appendix for the question battery). The questions are also written quite openly, which gives the interviewee the ability to answer in a broader way and talk about what they believe to be important to mention (Bryman & Bell, 2015). As seen in the appendix, the question battery was designed around four elements, of which all are related to the research question. The selection of questions occurred at a broader level to ensure that every potential aspect of the research questions was covered. Naturally, not all information gathered from the interviews was used since not all questions are relevant to the research question. The question battery was used in all four interviews, but different weight has been given to different questions regarding the area of expertise the interviewee has. For example, the question “*Would you in the current state of crypto currency be willing to lend, borrow, or trade with bitcoin? If not, do you see it as a possibility in the future?*” had more weight during the interview with the representative from the bank since lending and borrowing is the core of their business.

Since all four interviewees are native speakers of Swedish, they were asked beforehand if they felt comfortable using English or if they instead preferred Swedish. Two out of four interviewees chose to conduct the interviews in Swedish. The selected language is stated in every interview transcript in the appendix. The use of the English language was preferred since this would minimize the risk of contamination when translating the interviewees' responses. However, we felt a greater need for the participants' comfort and their ability to communicate to their fullest extent than to reduce the risk of contamination. There is an obvious risk otherwise that the collected data will not be sufficient because of difficulties in articulating reasoning and argumentation. How this could have affected the objectivity of this report is further discussed under “Objectivity” (2.4.3).

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During all four interviews, only one author was present during the interview, which according to Bryman and Bell (2016) could have both advantages and disadvantages. Being more than one interviewer could give the interviewers greater ability to align the interview if one of them believes it to be off-topic. However, we believe that this will not be necessary given the negative aspects of being more than one interviewer present. There is an obvious risk that the interviewee feels uncomfortable with having more than one interviewer. This could in some cases affect the quality of the interview where the discussion between the interviewer and the interviewee is affected (Bryman & Bell, 2015).

Due to the ongoing pandemic, the interviews had to take place over the internet, where Zoom or Microsoft Teams were preferred. Three out of four interviewees were conducted over Zoom or Microsoft Teams, which gave the interviewer and the interviewee the ability to perceive gestures and body language during the interview and for the interview to come as close as possible to a face-to-face one (Bryman & Bell, 2015).

### 4.2.2. Interview participants

We chose to interview four different people within different areas that have different responsibilities. The selection of interviewees was based primarily on their position within the company or their area of expertise. More interviews could have been conducted, but we believe that quality over quantity is preferred since the primary data are combined with secondary data, where quantity is preferred. We have therefore been more selective with who we interviewed and not put emphasis on qualitative interviews where we believed beforehand that the interviewee could give a relatively unique insight into the research area compared to an interview with someone else, either lower down in the company or someone with limited experience in the field. This has given us four very experienced interviewees, all with their own experiences and thoughts on the research area. The four different interviewees and the companies they work for are presented below.

#### 4.2.2.1. *Bank*

The interviewee works as a market analyst within one of Sweden's largest banks. His area of responsibility is macroeconomics and financial market analyst. He has been working within the company for 21 years and almost entirely within this area. He has previously been

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working at another bank. He has a bachelor of business administration from a top business school in Sweden. The company he works for is a large bank operating within Sweden. The core activity of the company is banking and insurance. The company is divided into different smaller regional companies which have around 600 employees. The turnover for the company is around 2 billion SEK.

### *4.2.2.2. Tech company*

The interviewee works within the multiparty system and the blockchain practice. As a subdivision to this, the interviewee works with financial infrastructure, where his area of responsibility is central bank digital currencies, digital assets, and custody. He has been working within this field for more than two years at the same company. The interviewee also has previous experiences within Ethereum, where he codes contracts as well as building nonfungible tokens. The interviewee has an academic background where he has studied several courses regarding blockchain. The company he works for is an IT company which operates across the whole globe. The company does almost everything within consulting. The company has over half a million employees worldwide and around 1,300 employees in Sweden. The company had a turnover last year of 44.3 billion USD.

### *4.2.2.3. Construction company*

The interviewee is the responsible controller within the division “construction” at the company. His main area of responsibility is to be responsible for the overall economy within this division. He has been working within the company for almost 16 years. He has during his time at the company been working with different economical functions but has during the last 5 years been working at the current position. Previous positions were, for example, divisional controller. He holds a bachelor’s degree in business administration. The company he works for operates in Sweden, Norway, and Finland and works with construction and more specifically construction contracts where the company builds roads, hospitals, and so on. The division he represents has around 6,000 employees. The turnover past year was around 27 billion SEK.

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### 4.2.2.4. Consulting company

The interviewee is an audit partner, which means that they are one of the owners of the business. The interviewee is therefore responsible for the development of the firm as well as securing new business opportunities, among other things. The interviewee has spent their entire career, which is 25 years, at the consulting firm where they have only been working within auditing. The interviewee holds a bachelor's degree in business administration. The company that the interviewee works for is a multinational consulting firm that operates in all major countries across the globe. The company's focus is on auditing, but it also offers services within tax and the advisory sector. The company has around 1,800 employees in Sweden.

### 4.3. Selection of Secondary Data

The secondary data used in this thesis consist of articles and books. We searched for articles primarily through Scencedirect. The following search words were used when searching for articles: "Bitcoin," "money," "currency," fiat "money," paper "money," and "three functions of money." We then selected interesting articles for further reading based on the abstract of the paper. If we found the abstract similar to the research question or area of study, we chose to read the full article and eventually include it in this paper. Since we used Scencedirect, we could be confident in the quality of the papers that we included. Books have also been a source for secondary data. We mainly found books through suggestions from other sources—for example, podcasts talking about cryptocurrencies—and referred to the books that we used.

### 4.4. Validity, Reliability, Objectivity, and Information Evaluation

#### 4.4.1. Validity

Due to the combination of qualitative and quantitative data, the validity is of great importance, and we have therefore placed considerable emphasis on ensuring the validity of this thesis. External validity is of particular importance, especially in regard to the primary data collected. Since the primary data only consist of four interviews with company representatives, this could possibly be negative for the external validity. The interviewees could in theory have other views and beliefs about money and the economy in general

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compared to other potential interviewees. We have therefore placed emphasis on ensuring transferability by interviewing individuals with different experiences, different roles, and working for different companies within different fields. Due to their relatively long time at the position, relatively unique position, or area of responsibility, the interviewees can reason and argue on a more general level compared to others, which also increases the internal validity. The external validity of the primary data could also be affected by our design of research questions. Making the questions more open to interpretation could lead to difficulties in generalizing the findings. A different interpretation of the question is likely to lead to a different answer and discussion from that of the interviewee. To counteract this and ensure validity, we tried to align the interviewee when they were off track without affecting their answer or reasoning.

There is an inherent trade-off depending on what type of validity a researcher chooses to focus on. There is a natural decline in external validity if one chooses to focus on a more controlled study and vice versa if one chooses to focus on a study in the real world. We have tried to combat this trade-off by first performing our research in a controlled manner by conducting interviews and thereafter conducting research out in the real world by gathering secondary data. The trade-off in validity is minimized by comparing the primary and secondary data and seeing if the findings hold in the real world.

### 4.4.2. Reliability

According to Bryman, Bell, and Harley (2019), reliability is of great importance. To ensure the reliability of this paper, we first planned every methodological step thoroughly in order to make sure every step of the research followed the plan. One action to ensure reliability was to select semistructured interviews and use them consistently. We also tried to standardize the data collection by selecting similar articles and books relating to each other through keywords and so on. This minimized the possibility for external factors to affect the results.

### 4.4.3. Objectivity

The objectivity of this report is of great importance since all of the primary data were collected through interviews. As mentioned under “Interview design” (2.2.1), two out of the

four interviews conducted were in Swedish. This required a translation into English, which could—according to Bryman, Bell, and Harley (2019)—affect the objectivity of the report through our own interpretations and thoughts unintentionally affecting the findings. Complete objectivity is—according to Bryman, Bell, and Harley (2019)—hard to achieve, but to combat this potentially negative effect, we translated and transcribed all the interviews and thereafter sent the translated transcript to the interviewees when we felt the need to do so. This eliminated interpretational risk when translating and gave the interviewees the ability to correct parts they did not agree with.

#### 4.4.4. Information evaluation

To continuously ensure that the source is valid and reliable as well as relevant to the research questions is a hard task to meet. The criteria have instead always been considered throughout the whole process in order to ensure quality sources (Bryman & Bell, 2017). Several actions, which can be found throughout this chapter, were conducted to ensure validity and reliability. There are, however, still several risks in regard to source criticism. There is an obvious risk in regard to the quality of the primary data where we could not ensure beforehand that the interviewees were qualified or not to answer the research question to the fullest extent possible. There is also a risk in regard to the subjectivity of the interviewees' answers where the answer could be tainted by their own opinions.

## 5. Primary Findings

*The interview findings—to answer if BTC could fulfill the three requirements of money: as a medium of exchange, as a unit of account, and as a store of value—are here presented individually. Quotes from the interviewees are included in order to highlight certain findings as well as making the reading more appealing.*

### 5.1. Feasible Medium of Exchange

#### 5.1.1. Fundamental challenges

As mentioned by the interviewees, there are multiple challenges hindering BTC from being considered as a medium of exchange. First, the interviewees argue that there is currently no widespread acceptance of BTC as a medium of exchange. The acceptance rate, especially for smaller companies and actors on the market, is too low. Another interviewee indicated that the technicality behind what is required for handling transactions in BTC is too great for most potential users.

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*“I also do not believe bitcoin to be a good means of payment since the acceptance rate of bitcoin overall is too low”—Interviewee B*

*“To make it even more successful you need to increase people’s awareness about it and also make sure that people can feel secure using it by securing transactions”—Interviewee D*

*“For widespread adoption, and I guess what you are aiming for here is how we can replace what we currently pay with in stores, etc. First, it is a very technical thing. It is a hurdle to start using it and the use cases are not that big as of yet”—Interviewee A*

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The interviewees also argue that there is a fundamental difference between BTC and other fiat currencies and gold. Gold and other currencies have the advantage of being physical, which BTC is in most cases not. The disadvantage of physical presence could mean a lack of usability in some situations where people would not be able to use BTC as a

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function of exchange whether gold, for example, could be used in many situations, including crisis or even a state of collapse.

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*“I can however see a difference between bitcoin and gold, for example. One of the more prominent advantages of gold is that it is physical, where you can show that you have it and you can trade it over physically. Gold is also internationally accepted as a payment method. I would say that gold is the most accepted currency. Even in a state of war or social collapse, gold could function as a means of payment to, for example, pay for a ticket out of the country or to bribe a soldier”—Interviewee B*

*“Bitcoins are more digital where traditional currencies are physical... It might be an alternative good solution to traditional physical currency when we are mature enough”—Interviewee D*

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Interviewees also note the relatively high transaction fees that are associated with BTC compared to other currencies. The high transaction fees do limit BTC as a viable medium of exchange in many transactions since it would not make any sense to spend almost the same amount on the transaction fee as on the product or service being bought. The interviewees also indicate that the transaction fees will likely increase in value, making BTC even less likely to become used in a widespread manner. Today, miners mostly obtain their profits from new BTC, but in around 100 years, the cap of the total amount of BTC possible will be reached. This means that the only incentive left for miners will be the transaction fees obtained from mining. This will most certainly increase the fee of a transaction.

Interviewees also point out that a limited amount of transactions can be done, which is around 3–5 transactions per second (TPS). The TPS is quite slow compared to other providers such as Visa or Mastercard. This problem can, however, be minimized using so-called “side chain streams,” which means that two parties have multiple transactions between themselves, and when they have finished, they report it to the network as a single transaction. There is also no real system in place governing how to handle a payment transaction in BTC. There are no terminals, for example, for payments as there are for Visa and Mastercard transactions.

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*“It is similar to my reasoning for the first question. I believe that money is something that almost everyone accepts as a means of payment, does not fluctuate too much in value, and does not have high transaction rates. This is money for me, and I believe that bitcoin lacks all of those characteristics”—Interviewee B*

*“The big incentive right now is to create the next block since they get bitcoins out of it. But by 2100, we will have reached the cap of bitcoins in circulation, and the only incentives for miners would be the transaction fees, and then the transaction fees will go up”—Interviewee A*

*“This means on average that you can put between 1,000 to 3,000 transactions into one block. One block in bitcoin is created in around 10 minutes. That means if we have 10 minutes per block and around 3,000 transactions that we have a TPS of around 3 to 5. That is quite slow compared to Visa and Mastercard. They have been trying to optimize this with the so-called lightning network where you kind of open off-chain or side chain steams”—Interviewee A*

*“It is not impossible to do it. Today, we have Mastercard and Visa, and bitcoin kind of needs the same structure as they have where you need, for example, terminals that can process the transactions”—Interviewee A*

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There could also be technical obstacles hindering BTC from functioning as a medium of exchange. The “blockchain trilemma” is a concept that consists of three features that are difficult to maintain simultaneously. These features are decentralization, scalability, and security. The trilemma forces creators to sacrifice one of the three in order to achieve the other two. Scalability is the one that is often left behind due to the obvious need of the other two. The decentralization aspect is needed given what the community is trying to achieve. Security is also a necessary function since no financial system will work without it. This leaves scalability as the odd one out. In regard to blockchain, scalability refers to how efficient the network is in processing transactions.

There are also technical risks associated with BTC and blockchain technology. The so-called “51% network attack” means that one actor can take over the network if they control 51% or more of the total mining power. There is also the possibility of censorship risks where actors can choose not to include transactions. This could eventually lead to other actors also not including transactions, leaving the transactors out of the network.

*“I think bitcoin in itself has some challenges in terms of scalability. There is a famous trilemma called the blockchain trilemma where you have to pick two out of the three, which are decentralization, security, and scalability. Given that what the cypherpunk community tries to develop is based on decentralization, and the aspect of security is needed because without the security a financial system will never work. This kind of leaves scalability as the one missing out”—Interviewee A*

*“There is an obvious censorship risk where actors within the community can choose to not include your block or never work on a block that includes someone’s transactions, which is kind of a censorship attack. This could lead to other miners also stopping including your transactions... There is also the 51% network attack where you take over the network if you control more than 50% of the mining power”—Interviewee A*

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For widespread adoption of BTC as an exchange tool, there needs to be a public need and acceptance, which the interviewees argue there is not. There is doubt surrounding whether BTC is really needed as a complement to other means of payments. The interviewees suggest that the need for BTC could be different depending on geographical location. Countries such as Sweden do not really need a decentralized currency since the trust in the government is relatively high compared to countries such as Zimbabwe where there is little to no trust alongside corruption.

The technical aspect of BTC and blockchain could also affect the need and acceptance among the general public. The relatively complex system could for most people be hard to understand. Many believe that BTC is blockchain and vice versa. People do not understand the technical aspects underlying the system and therefore do not understand that they are two separate things. In order for BTC to function as a currency, people need to understand the technical aspects. One might need to make the technology easier to understand in order to achieve widespread adoption.

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*“I would say that this question is kind of leaning more towards different geographical parts of the world. I would not say that if we look for Sweden, we are not really solving any problems. I would not say that we have an issue of trust in Sweden, which it might be in other*

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*countries like Zimbabwe or other countries in Africa where there is little to no trust in the government where there is a lot of corruption”—Interviewee A*

*“First, I think people do not understand it and also when you are speaking about blockchain as an example, people think bitcoin. But really, it is two separate things, I mean just because there is blockchain does not mean it is bitcoin. I think people would have to understand it better for it to even become a currency. Then again, the technology is quite complex to understand and you need to make it easier to understand it if you want widespread adoption”—Interviewee A*

### 5.1.2. Upsides of bitcoin as a medium of exchange

The interviewees also note the upsides with BTC. One significant advantage of BTC compared to some other types of payments is the possibility of paying from any geographical location in the world. Furthermore, one does not need a full node to be able to operate, which means that one does not have to download the block. Another upside of BTC is that there are currencies such as the Venezuelan bolívar soberano that are also affected by low trust and high inflation. The advantage BTC has could therefore be that it could potentially replace badly managed currencies.

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*“There are also upsides with bitcoin, however. I mean, payments do not have any geographical constraints: you can process a bitcoin transaction from anywhere in the world. You do not need a full node to operate, and by that, I mean that you do not need to download the block to your device. It is enough to have what they call a lightweight node”—Interviewee A*

*“There are, however, currencies today that have the same problem; for example, in Venezuela. The inflation some currencies have when people do not believe in them also has this problem. This could indicate that bitcoin is as good a currency as the currency in Venezuela”—Interviewee C*

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An interviewee also argues for the speed of a BTC transaction as something positive,

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depending on what the type of transaction is. There are examples of when a purchase is not feasible with BTC, such as buying a coffee, but there are also situations where the transaction time is significantly faster than current transaction speeds. One example of when BTC transactions could be faster than traditional methods is payments regarding funds. This could take days the traditional way but only minutes if BTC were used. The use of BTC could also vary depending on geographical location and the financial infrastructure of that specific country. In Sweden, for example, a relatively fast means of person-to-person payment exists through an application called “Swish,” which might not exist in other countries. BTC could therefore be used in a similar way when transactions are made from people to people. The transaction speed of 10 minutes is likely to be faster than a bank transfer.

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*“Also, depending on what kind of transaction it is, it could be quicker. I mean, purchasing a coffee for example would not be the best thing to do on the network since the transaction fee would probably be bigger than the cost of the coffee itself and the time for the transaction fee would probably take longer than 10 minutes. Making payments regarding funds could take days in traditional ways, but with bitcoin, it could be done much quicker”—Interviewee A*

*“The advantage is the relatively fast way of transactions between two parties, depending on what type of transaction you compare with as well as it could become more credible”—Interviewee D*

*“I also believe that bitcoin could function similarly to Swish, where bitcoin can function similarly in countries that do not really have the same infrastructure as Sweden”—Interviewee C*

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BTC is also outside the banking system, which could be seen as an advantage since it is not directly connected to any inflation. One interviewee mentions that BTC originated during a financial crisis and the purpose of BTC was a way around the problems regarding inflation.

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*“I think that bitcoin originated during a financial crisis where you were affected by central banks, you then wanted to find a way around that”—Interviewee C*

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*“One advantage bitcoin has is that it is outside the banking system and that is not directly connected to any type of inflation”—Interviewee C*

### 5.2. Bitcoin As Unit of Account

#### 5.2.1. Volatility

BTC also needs to function as a unit of account, which means a measurement of value that enables us to compare the value of one thing to another. The interviewees all agree that the volatility of BTC is high, which means that the price of a BTC could go up and down. This could pose a problem when comparing the value of one thing to another if the risk of the comparison will not be accurate the day after. This volatility does not align with fundamental economic principles. This could, for example, hinder the most simple economical calculations of future cash flow. Traditional fiat currencies are, however, also volatile since they also are dependent on printing of money, export, import, and so on, but not as volatile as BTC. They are monitored and backed by an institution or government, which BTC is not since it is decentralized, which makes them more stable.

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*“As long as bitcoin has the volatility as it has now, I do not find bitcoin to fill any role, either regarding inflation or any other function”—Interviewee B*

*“But if we are thinking about physical bank notes, they are backed by the government. bitcoin is certainly not since it is fully decentralized. It is also, as we touched on before, very volatile”—Interviewee A*

*“Fiat currencies today do fluctuate, depending on export and import, the printing of money, etc., and everything affects the underlying value of the fiat currency. Then again, if you were to use it as a currency, it would be mental to either buy or sell with the currency since one day, bitcoin could be worth a lot more or worth a lot less. That is kind of a problem since it does not comply with fundamental economic principles”—Interviewee A.*

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### 5.2.2. The need for bitcoin

For BTC to function as a means of comparison, there must be a need for a comparison medium worldwide. There are, however, different needs on a geographical level where some countries need an alternative to fiat currencies more than others. Sweden and other developed countries, for example, do not need an alternative as much as other countries do. The need for an alternative to fiat currencies could be that there is little to no trust in the government or the financial system. More developed countries also have the same or similar financial infrastructure in place that BTC is providing, whereas less developed countries have a need for such financial infrastructure. This could mean that there would be an uneven adoption of BTC as a comparison tool, which would limit its use. One interviewee also questions the need for BTC at a macroeconomic level. The need for a decentralized alternative could in some cases not even exist. The interviewee instead argues that it could be damaging to implement BTC since the central bank's ability to affect the economy is beneficial.

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*“The second part is the availability to pay, so in Sweden, we have a quite robust financial infrastructure in place. In that sense, we do not have the need for a system like bitcoin since we do not have low trust in our banks and government, and there is no need for this financial infrastructure since we have solutions to conduct payments in a good way”—Interviewee A*

*“There are, however, indirect impacts of bitcoin because it takes away the monetary leverage from the central bank, which of course is the reason behind bitcoin. I do however think that this is negative. So I actually believe that bitcoin has a negative impact on the global economy since bitcoin takes away the central banks' ability to affect the economy”—Interviewee B*

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### 5.2.3. The believed value of bitcoin

For BTC to become a feasible measurement of value, everyone must acknowledge the true value of BTC in the same way. The interviewees indicated that this is not the case where the perceived value can differ since money is invented and contains a value everyone agrees

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on. Another interview mentions, regarding the stock-to-flow model, that it could be hard to claim that the value of BTC is the true value just because you have limited the flow of BTC.

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*“What is money, it is made up. Money is basically accounting on two ends ... If bitcoin then can serve this function? I mean yes, we have seen people trade with bitcoin where they have bought pizza with bitcoin. It can definitely be an intermediate function of trades”*—

*Interviewee A*

*“I do not believe that you can take something and limit the flow of that specific thing and then say that you have some sort of value”*—*Interviewee B*

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Further, according to the interviewee, money has a made up value, people need to believe and have faith in the system in order for it to work. Some people do have faith in the system where smaller payments have been made, but on an overall level, faith is lacking. Additionally, there are political factors also hindering it from becoming a currency. This is a significant disadvantage for BTC.

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*“I am no expert within this field, but if I just reason, I believe that bitcoin could become a currency in the future when it has become more accepted. If everyone believes in the system, bitcoin could then become functional. But as it is now, not everyone believes in it, and there are political factors also hindering it from becoming a currency”*—*Interviewee C*

*“The big difference between bitcoin and gold or paper money is that I believe not everyone believes in it, which is a disadvantage for bitcoin”*—*Interviewee C*

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### 5.3. Store of Value

#### 5.3.1. Volatility and inflation

The volatility of BTC makes it an unsuitable candidate in storing value for the future. The possibility of storing value in BTC is low due to the relatively high volatility that is associated with BTC. One interviewee mentioned that the volatility naturally also could cause people to avoid lending or borrowing BTC. The main reasons why people would avoid

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lending and borrowing are the relatively high risks associated with it resulting in high borrowing fees. Naturally, BTC does not fulfill its purpose of storing value if the possibility of lending or borrowing is not feasible.

One interviewee mentioned that they see BTC more as an investment rather than a currency. An investment can store value if the investment is successful. It can, however, also be unsuccessful and result in a loss of value. Therefore, the store-of-value function for future use might not be achieved through relatively high volatility.

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*“There is however no store of value since the fluctuation of bitcoin is too high”—Interviewee B*

*“In regard to bitcoin, I feel it’s too early to be able to secure the future value”—Interviewee D*

*“The volatility needs to be similar to other currencies and the transaction costs need to be lower for me to trade, borrow, or lend with bitcoin”—Interviewee B*

*“I would say yes, I see it closer to an investment rather than a currency”—Interviewee C*

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Further, the increased value over time, which BTC has been a subject of, does not favor BTC as a currency if the volatility is high and people consider BTC as an investment rather than a currency to use. There are minimal incentives to use BTC as a means of payment if there is a chance that the value of a BTC might increase in the coming days.

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*“I cannot use bitcoin as a measure of payment if it can increase in value of more than 50% in one day. That minimizes the usage of bitcoin”—Interviewee B*

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### 5.3.2. Storing value for future use

For BTC to be considered money, there needs to be a proper and safe way of storing BTC in order to preserve its value. Several of the interviewees thought about the problems regarding safeness and the possibilities of storage. There are multiple ways to store BTC as well as multiple levels of precaution one can take when it comes to storing. One can first

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store the key online in something called a hot key. There is also the possibility of storing the key in something called cold storage, which means storing the key on a hard drive. There is also a type of storage called mnemonic storing, where a combination of words works as the key in the person's mind. The different storage possibilities all come with different types of security risks since if the key is lost, access to BTC is also lost. Storing the key online could possess risks of the key getting stolen or hacked. Storing the key on a hard drive means that if control over it or the hard drive is lost, the key is also lost. Using mnemonic storage is the safest way, but access can still be lost to BTC if the words are forgotten.

There are, however, also risks related to owning and storing value in traditional fiat currencies or online. Money can be stolen if a person breaks into a house or steals or hacks personal information and password, which could give them access to a person's bank accounts. In these cases, however, the money is usually insured, and there is recourse in such events. This could not be said regarding BTC as the currency is decentralized and is not insured.

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*“There are also risks in storage. You can store bitcoins and other currencies in different ways. You can store it in something that is called a hot wallet. And that is a wallet that is completely online. Bitcoin is using cryptography and public and private keepers. The private key is kind of the key to the money. If you lose your private key, you lose all your money. If the key is hacked, you also lose all your money. Hot wallets are therefore a security risk. You can also have something called cold storage, which is hard drives where you can store your key on. If you lose this hard drive, you lose your money. You can also store your key on a piece of paper but if your house burns down, you lose your money. You can also store it in something called a mnemonic. This is a phrase of around 10 to 15 words that you memorize in your head. When you mash these random words into an algorithm you get your key. This is the safest way, I guess, but you can still lose it if you forget the words”—Interviewee A*

*“There is of course a risk that this could happen. But there is also a risk that I get robbed at my current bank or on the streets. There is, however, some insurance if this were to happen. The system with insurance is, however, hard to implement on bitcoin since I do not know where one would turn if you get hacked or robbed of your bitcoins”—Interviewee C*

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There are also risks regarding storage when it comes to governmental actions against the network. One interviewee points out that almost one-fifth of all BTC have been lost, partly by governmental actions, specifically from China and the United States. Mining sites in China have, for example, been shut down, which results in the loss of BTC. In regard to banning the whole system, however, few governments are trying, and it is unlikely that they will succeed.

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*“We have seen China kind of being wary of cryptocurrencies and trying to ban it, but they have not even come close to succeeding since the use of cryptocurrencies is big in China”—Interviewee A*

*“I have heard that almost one-fifth of all bitcoins that have been mined has been lost. This is due partly because of governmental actions from specifically China and the USA. In China, the government has shut down mining sites and bitcoins were as a result of this bitcoins were lost”—Interviewee B*

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## 6. Analysis and Discussion

This section analyzes the theoretical as well as the interview findings and whether the three key properties of money—as a medium of exchange, unit of account, and store of value—also hold for the cryptocurrency BTC. Moreover, an informal discussion is given of the potential role of BTC in the digital economy of the future.

### 6.1. Bitcoin as a Store of Value

Any metal that has been utilized as a monetary medium other than gold has been overproduced to the point that its price has crashed (Selgin, 2015). As previously discussed in section 3, contemporary economies feature central banks that appear to fight inflation while gradually or rapidly degrading the value of their currency. BTC is the first commodity with a hard supply restriction of 21 million BTC, regardless of how many people use the network. There is no technical way to raise supply to meet the rising demand. Because each BTC can be divided into 100 million satoshis, there is plenty of opportunity for BTC to increase through the usage of smaller units as its value rises. This might result in the creation of a new sort of asset that is well-suited to serving as a store of value.

The limited supply can, however, also become a problem according to the interview findings. If there is a finite supply and people's demand increases, the value of BTC will likely increase. The store-of-value function is to eventually spend the currency, and if the value of BTC increases too much, the incentives to eventually spend the money could be questioned. Inflation is always needed in order to incentivize spending, but there is a point where the incentives change where BTC could be more similar to an investment where spending is no longer reasonable. One could, however, argue that this reason is limited to the current state BTC is currently in with relatively high volatility. As more and more people start using BTC as a means of payment, the inflations will likely decrease when the increasing demand for BTC has stabilized to a point where the true value of a BTC is found (Appendix B).

Until the development of Bitcoin in 2009, historical currencies were infinite in quantity and hence flawed in their capacity to store value over time. Because of BTC's unchanging monetary supply, it is the finest medium for storing the value created over the finite human period, making it probably the finest store of value humankind has ever

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constructed, because BTC is the only monetary medium that cannot be debased, regardless of how much the value grows in the future.

A significant aspect of the previously described lowered supply of BTC and the continually decreasing pace at which supply grows is that the supply of current BTC is quite big in comparison to the new supply. In that way, one might argue that BTC mining is analogous to gold mining, guaranteeing that as a monetary medium, rather less time and effort is spent on securing fresh supplies than on fiat currencies, whose supply are easy to increase. This leads to more time and effort is committed to a more productive economy.

Some previous discussed items have been utilized as a store of value throughout history. The function of a store of value does not require a physical item, but a physical item made increasing the supply of the store of value more difficult. BTC has no physical presence, and because it is solely digital, it may reach rigorous scarcity. This scarcity enables individuals to transit wealth digitally without relying on the physical world, allowing vast quantities to be transferred across the globe in minutes. The digital scarcity of BTC units combine characteristics of tangible monetary items without any of the physical constraints associated with transporting and transferring it, which incentivizes saving behaviour.

According to the interviews a lack of physical presence requires other solutions to store value for future use. The interview findings suggest increased risks and uncertainty regarding how to properly store BTC. There are multiple ways, each with unique advantages and disadvantages. The storing of BTC has been highlighted as a major issue in order to store value, where almost one-fifth of all BTC have been lost. The storage of BTC has challenges, but there are not unique to BTC. There are similar risks found in other currencies used today where there is a risk of robbery or hacking, where either physical or digital currency is lost. However, the centralized currencies used today often come with different securities such as insurance and customer service in case of transaction mistakes. There is no such thing for BTC, where lost account information or robbery is not insured. The security that fiat currencies have compared to BTC could affect the trust users have in the possibility to store value for future use (Appendix B).

### 6.2. Bitcoin's Individual Freedom and Online Settlement

According to the research, one of BTC's primary value propositions is that it allows anybody in the globe to access sovereign base money. One may argue that anybody who

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possesses BTC obtains a level of economic independence that was not before conceivable. BTC owners may transmit enormous quantities of money across several nations without the need for approval from any institution. Furthermore, because BTC's value is not dependent on physical characteristics in the world, it cannot be hampered, destroyed, or confiscated.

The interview findings suggest, however, that the lack of a physical presence also can have a negative effect. The overall usage of BTC could be impacted since there could be situations where online payments are not possible for different reasons. We do, however, believe that the situations where online payments are not possible are limited. Due to the widespread availability through phones, for example, we do not see this as a factor that could hinder BTC from being a medium of exchange (Appendix B).

BTC is a defensive technology that ensures safeguarding property and information significantly to be less expensive than attacking them. It makes fraud and theft highly expensive and unpredictable, so favoring people who prefer to live in peace and without aggressiveness against others. Furthermore, one may argue that BTC provides a mechanism to address the power imbalance that has formed over the last century as governments have been able to appropriate money into their central banks, making people all over the world dependant on them for their well-being. Gold, the historical equivalent of sound money, lacked these benefits. Because of its materiality, gold was subject to political control. Because gold could not be transported in an easy way, payments based on it were consolidated in banks and central banks, making confiscation simple (Salerno, 2010). Verifying transactions with BTC, on the other hand, is simple and almost cheap, as anybody with an Internet connection may see the transactions ledger for free.

One might even argue that if Bitcoin continues to expand and take a bigger portion of global wealth, it would compel governments to increasingly become a type of voluntary organization that can only collect taxes willingly by providing a service to its people that they are happy to pay for. It remains to be seen, if BTC is widely accepted among the market. The wide acceptance of BTC will have a considerably beneficial impact on individual liberty by decreasing the government's capacity to finance its operations through inflation.

Historically, gold was used as a payment medium and a store of wealth all across the world. The inability of any side to significantly increase its supply aided its success. As governments confiscated gold and established their own money, worldwide settlements between people and banks could no longer be handled in gold; instead, they were performed in national currencies that fluctuated in value, causing substantial challenges for international trade, as stated above. One may argue that the introduction of BTC has resulted in the

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creation of an independent form of international settlement that does not rely on any authority as a middleman and can function completely independently from the current monetary infrastructure. This is demonstrated by the competence of anyone to host a BTC node and transmit their own money based on pseudonymity. Furthermore, there is no need for BTC to be saved on a computer; a person's private BTC key, which give access to its holding, is simply a series of letters or a series of phrases, hopefully saved and remembered by the individual. When compared to other tangible assets, a BTC private key is considerably easier to move about than a horde of gold, and considerably easier to transmit across the world without fear of theft or seizure. Historically, major governments confiscated gold from their citizens with forcing them to use fiat currencies as a new form of payment backed by gold, but with BTC individuals are able to keep their holdings away from government and using intermediaries for smaller transactions of payment. BTC's nature and its underlying technology places governments and central banks at a significant disadvantage in comparison to fiat currency, especially in the case of confiscation and controlling. Furthermore, because BTC owners can trace all of their BTC holdings on the blockchain, it is exceedingly impracticable for any government to operate as a lender for banks dealing with BTC. During the worldwide gold standard, money could be redeemed in gold.

We think that the usage of BTC in the future is for small payments which are not conducted over the distributed ledger but through second layers. For example, the Lightning Network (LN) of Bitcoin, introduced in 2015, is a second layer added to the Bitcoin network that allows transactions to take place outside of the blockchain, also referred to as off-chain transactions. The process off-chain transactions work by swapping private keys to an existing wallet rather than transferring quantities of money and they do not need the use of an intermediary. The Lightning Network is intended to shorten transaction processing times while lowering the associated costs of Bitcoin's blockchain (Poon & Dryja, 2016).

As BTC continues to move toward a greater market value with greater transaction fees, it is beginning to resemble a reserve money rather than a currency for everyday trade and transactions. BTC is still in its early days of market adoption and most of BTC transactions are not recorded on-chain, instead taking place via exchanges and different sorts of BTC-based web platforms. These BTC-based online platforms might transfer BTC to their consumers on own established internal records and only perform BTC network transactions when users want to deposit or withdraw monies. BTC's comparative advantage, as digital cash, is not the replacement of cash payments, but rather BTC properties allow for large cash payments across large distances due to its underlying technology. Payments for small

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transactions can be made using a variety of methods (cash, barter, credit cards, etc.). Current cutting-edge payment settlement technology has already offered a plethora of choices for resolving small-scale payments at low cost. Only major currencies are accepted for payment throughout the world. Most of international transactions are denominated in the USD, EUR or IMF Drawing Rights, with a few other major currencies accounting for a minuscule portion. Sending a few thousand dollars in various currencies worldwide typically costs hundreds of dollars or euros, takes several days, and is subject to banking institution scrutiny. The high cost of these transactions is largely due to the volatility in exchange rates of currencies and the difficulties in settling between organizations in various nations, which requires the use of many layers of intermediary institutions (Böhm-Bawerk, 2017).

According to the interview findings, this reasoning could diminish the criticism of relatively slow transaction speeds as well as the relatively high transaction rates. By arguing for an alternative focus on what type of transactions BTC would work best for, the relevance of speed and costs diminish. Regarding certain types of transactions as mentioned above, the incentives of BTC transactions increase since the relative transaction speed is considerably faster than some bank transfers (Appendix B).

BTC has already gained a large degree of global liquidity since its introduction in 2009, enabling for international payments at rates of far lower than conventional transactions. We do not think that Bitcoin will detach the current money market; but we would like to highlight the liquidity potential in the long-term. Today, the volume of international transactions is significantly higher than what BTC's blockchain technology can manage, and if more monetary payments transfer to BTC, the fees will automatically climb to restrict demand. The interview findings mention the blockchain trilemma that could potentially limit the capabilities of BTC; more specifically, the scalability. This could potentially counteract the finite scalability of the network is without tampering with security and decentralization (Appendix B).

BTC has the benefit of not relying to counterparty risk. Moreover, BTC's network can complete international settlement of large volume transaction in a shortly timeframe. Therefore, BTC may participate in international settlement transactions between central banks and large financial institutions due to its cryptographic security, verifiable record, and resistance to counterparty risk. Major national currencies entails the risk of exchange rate volatility for international settlements as well as faith in numerous intermediaries. Settlement transfers between central banks and financial institutions can last a few days, exposing both parties to exchange rate as well as counterparty risk. Historically, Gold was the only

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monetary unit free of counterparty risk; nonetheless, transporting gold was very costly and dangerous process.

BTC's monetary properties fit the same function that gold did under the historical gold standard, providing no third-party risk and no dependence on intermediaries. For the international system, this is a neutral currency, and since it is not linked to the economy of any single country, its value does not affect the denominated trade volume, thus preventing any exchange rate problems. The core of the BTC network resides on its strict currency supply, which a central authority cannot inflate. In comparison to the main monies, which supply may be manipulated, this property makes BTC more valuable for people who utilize it as a value store. A money form whose supply is strictly limited and cannot be inflated by central banks, is the basis for the BTC network. This underlying basis making BTC properties more attractive as a store of value than major currency properties whose supply is not limited.

Even if all central banks cleared their accounts every day, BTC's transaction capacity is significantly greater than what the present number of central banks would require. The transactions on the BTC network are stored in BTC blocks. The BTC network's on-chain transaction processing capability is constrained by the average block generation time of 10 minutes and the original block size restriction of 1 megabyte. The network's throughput is constrained as a result of several factors working together. The highest anticipated transaction processing capacity using an average or median transaction size is between 3.3 and 7 TPS. BTC's current capacity is roughly 300,000 transactions per day, with an average of 3.1 TPS between April 17, 2021 and May 17, 2021. (Poon & Dryja, 2016).

The interview findings also point to solutions around the limited amount of transactions that can take place within the network. Even though BTC has been criticized for having a relatively low TPS ratio, there are possibilities of solving this problem by doing transactions off stream. The limited number of transactions possible could, however, still be a problem if widespread adoption were to happen. More structured transaction plans between actors could however minimize the total amount needed if increasing numbers of transactions happen off stream. This solution, however, is limited to use between only two actors. A cafe owner, for example, does transactions with many different actors every day, which limits the degree to which this type of solution can ameliorate TPS limitations (Appendix B).

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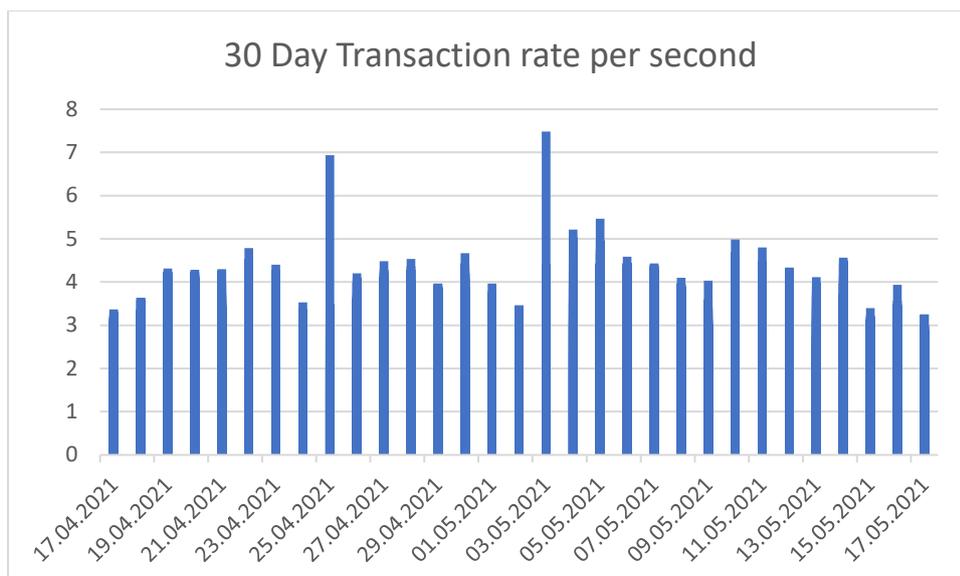


Figure 16 Bitcoin Transaction Rate Per Second Between April and May (Blockchain, 2021)

If governments that cannot produce additional BTC embrace BTC, these BTC central banks will be free to compete in supplying physical and digital BTC-backed monetary instruments and payment systems. Banking becomes an exceedingly perilous arrangement in the absence of a lender of fractional reserve, and we believe that banks can only survive in the long term if they provide monetary contracts (e.g.; cash, stocks, bonds etc.) entirely backed by BTC. If BTC's value continues to rise and it is accepted the majority of the financial market, it might be used as a reserve currency for a new type of central bank. Although those new type of central banks may be primarily established in the digital or physical worlds, it is becoming worthwhile to investigate whether national central banks might replace their reserves with BTC. National central banks in the present monetary-financial system retain reserves mostly in their nation's currency, IMF Standard Drawing Rights, and gold. Central banks use these kind of reserves to settle accounts between central banks as well as to safeguard the monetary value of their nation's currencies. If BTC continues to appreciate in the same manner as in prior years, central banks might consider to further investigate BTC. Furthermore, if BTC continues to rise considerably, the central bank will have greater flexibility in its monetary policy and foreign account settlement. Based on the quantity of BTC is limited to 21 million, it might be a good reason for central banks to invest a small fraction of their reserves to acquire a small fraction of BTCs to profit from its appreciation, if that is the case in the future. Meaning that, if BTC's value continues to rise in the absence of a central bank holding a small sum of BTCs, the monetary value of their

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reserve's currencies will fall in terms of BTC, putting central banks at a disadvantage of not holding reserves.

### 6.3. Bitcoin as a Global Unit of Account

Based on BTC's previous discussed properties, the following section concentrates on the final use of BTC as a global unit of account. Since the demise of the gold standard, currency value disparities between nations have hampered international trade. This limited people of undertaking indirect transactions with a single medium of exchange, as a result a world was created in which acquiring anything across international borders requires first acquiring the producer's currency. This has greatly restricted people's capacity to do cross-border economic calculations, resulting in the establishment of a vast foreign exchange sector. To possibly function as a global unit of account, Bitcoin needs to be embraced and accepted by the majority of the financial market. One possible form could be indirectly through its usage as a reserve currency by central banks worldwide. The probability of this happening, however, could be questioned based on the interview findings. Worldwide adoption requires a similar need, which one could argue does not exist. There are differences in need based on a number of different factors resulting in some countries having a greater need than others. The difference in need could result in an uneven adoption and need across the world. One could then question if BTC really serves as a means of comparison if there is not a similar need across the world. An uneven adoption could result in limitations of comparisons depending on where in the world a person operates, which does not really fit in the global economy we have today. Since money has an invented value, BTC also needs to be valued similarly. One could argue that this is not the case based on the volatility that BTC has. If every user agreed on the value of BTC, the value would be much more stable compared to what it is today (Appendix B). It remains to be seen if the stability of BTC's supply would result in the currency's value remaining consistent, given daily transactions in it would be minor in comparison to the quantities retained.

Currently, huge individual BTC transactions can have a significant influence on pricing, and huge differences in demand can create significant price fluctuations. However, this is a peculiarity of the current scenario, in which BTC, accounts for just a small portion of international settlement transfers and money supply. Purchasing BTC today may be considered an investment due to its quick growth as a store of value. Furthermore, one might

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consider BTC as an investment since it is still relatively small and has the potential to reach many multiples of its present size and worth, showing up in the current price volatility. If Bitcoin increases to a large share of the global money supply and international transfers, the demand for it will become substantially more predictable and consistent, resulting in the currency's value stabilizing. If Bitcoin becomes the world's primary currency, it will no longer have a significant possibility for a rise in value. In the long run, the lack of any body capable of managing BTC supply is likely to decrease price volatility. Short-term volatility in demand may become a less important determinant of the process if the monetary market is able to hedge BTC's supply and demand volatility, resulting in more stable pricing as supply becomes more predictable. BTC's scarcity leads to individuals accepting it as a favorable store of value, and individuals might accept fluctuations for specific timeframes if it experiences wide downfalls springs, which we can see currently (May, 2021). The permanence of volatility in BTC's value shows that BTC will not serve as a unit of account. It could serve as a unit of account if BTC would increase by many multiples of its current market value and in the proportion of financial markets who possess and accept it as such. The volatility is, according to the interview findings, higher than most other currencies used today. Compared to other currencies, however, which are affected by multiple different factors such as import, export, monetary policies, and so on, the volatility of BTC is only affected by supply and demand. This could, in the long run, result in low volatility since BTC's volatility is only affected by supply and demand and not reliant on additional influenceable factors. If suddenly, such as we see today, there is a massive increase in interest in the BTC market, resulting in the high volatility, there is no countermeasure any government or institution could take in order to prevent such a thing from happening (Appendix B).

BTC, as a store of value, might continue to increase larger savings demand, causing its market value to rise considerably in comparison to the major currencies until it becomes widely accepted, also in form of payments (e.g., salary). Bitcoin could achieve value stability and it may be preferable to utilizing national currencies for worldwide payment settlements since national monies vary in market value dependent on the nation's governing circumstances as well as their broad use as a worldwide reserve currency confers a benefit on the issuing nation. An international transfer currency like BTC might be unaffected by monetary policies of various countries. In this role, BTC would have an edge over gold since it can be settled in minutes and the legitimacy of transactions can be easily validated by

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anybody for a reasonable cost. Therefore one could argue that BTC monetary role would be rather specialized on international settlement and not day-to-day transactions.

## 7. Conclusion

There are numerous historical examples of hyperinflation and currency collapses that resulted in extreme changes in currency and economic values, similar to the changes in the value of BTC over the last ten years. In these cases, barter or alternative monetary items were quite often used to replace the collapsed currencies. While such currencies were frequently used as official money despite their extreme volatility, there is a fundamental difference between traditional fiat currencies and BTC. Historically, gold was used as a payment medium and a store of wealth across the world. Bitcoin is uniquely positioned to perform the same function that gold did during the time of the gold standard, with no counterparty risk and a strict supply schedule.

From the main research question “Is BTC Money” or more precisely “Do BTC’s properties fulfil the functions of money?” strong empirical analysis were based on the findings, which concludes that BTC operates more as an algorithm with a deterministic supply and growth rate tied to mathematical diligence, which tackles the shortcomings of both fiat currency and gold. BTC’s supply is strictly limited to 21 million units and can therefore not be manipulated by governments or centralized authorities as it is the case for the growth rate of the public supply of the USD. Cryptographic rules govern the currency, which are enforced decentralized by transparent computer codes. Therefore, despite its high historical volatility in comparison to major currencies, BTC may evolve as a store of value and an alternative to other store of values such as gold. Based on the findings we think that it is unlikely that companies or countries, in the near term, will adopt BTC as an official currency, because of the fear to lose control over their money supply and monetary policy. However, in the long run, BTC might be adopted due to its previous mentioned monetary properties.

BTC is the first commodity whose supply is tightly restricted, with no technological way of boosting supply to meet greater demand. Each BTC can be divided into 100 million units, thus BTC’s opportunity to increase is immense through the usage of smaller units as its value rises. This might result in the creation of a new sort of currency that is well-suited for serving as a store of value. BTC fulfils the function of a store of value when evaluating the supply growth, but demand growth relates to the rise of liquidity and the reliance on transaction costs. As of today, Bitcoin's liquidity is lower than that of the existing main currencies like the USD and EUR, but if BTC has a considerable improvement over alternatives of its transfer costs, this is projected to have a favourable impact on liquidity as

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well. Across the entire range of transaction costs, Bitcoin represents a significant improvement over alternative systems with the addition of second layers (e.g., Lightning Network), whether they are based on gold or fiat money. As a result, BTC could outcompete major currencies as well as gold, becoming a medium of exchange and an accepted monetary medium as money. Nevertheless, BTC's liquidity needs to improve, as its function as a store of value is highly dependent on Bitcoin's acceptance (liquidity). BTC faces significant challenges when looking into the future in regard to the evolution into mature stages as a medium of exchange and a monetary medium if sufficient liquidity is not available. Based on the findings, we can say that BTC could be classified as a medium of exchange and will likely increase its potential if different technical solutions like the implementation of off-chain transactions could result in a bigger widespread usage of large capital transactions, especially by central banks.

To possibly function as a global unit of account, BTC needs to be embraced by a very large number of users worldwide, we argue that this could happen through its usage as a reserve currency by central banks for international settlements between banks. Currently, huge individual BTC transactions can have a significant influence on pricing, and huge differences in demand can create significant price fluctuations. Nevertheless, BTC, as of today, accounts for only a small portion of international settlements and the related money supply. In the longer term, the lack of any entity capable of controlling BTC supply is expected to reduce price volatility. Daily fluctuations in demand may become less significant factors of the process, resulting in more stable pricing as supply becomes more predictable. Because of its scarcity, BTC is a very appealing choice as a store of value, and an increasing number of holders may be able to tolerate volatility for longer periods of time. The persistence volatility in BTC's value, on the other hand, will preclude it from serving as a unit of account. To work as a unit of account, BTC's market value needs to grow immensely as well as the users worldwide holding and accepting it. Widespread acceptance of Bitcoin may potentially have a bigger beneficial impact on individual liberty by decreasing the government's capacity to finance its operations through inflation. In theory, BTC works very well as a unit of account because of its design and purpose but in order to work as such unit of account it needs worldwide adoption by a majority of the individuals, which is not the case as of now. Due to the volatility and the difference in need depending on geographical location, we see it as unlikely that BTC in the near future will function as a unit of account. One can however not diminish the fact that BTC in theory works well and could very well be adopted in the future as a unit of account if enough people accept BTC as a monetary

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medium. It remains to be seen whether unregulated and globally “distributed” digital currencies like Bitcoin can compete with national fiat currencies and established stores of value like gold.

One of the biggest limitations of this thesis have been the limited knowledge of BTC and the history of money that the interview participants possessed which could have affected the results and conclusion. The knowledgebase of the interviewees varied, which concluded in an uneven use of findings from different interviewees. The interview findings are based more on interviewee A than any other, meaning that the findings could be affected by his/hers views more than others due to his/hers deeper knowledge about the subject. This type of bias is however inevitable since every thesis based on interview findings will encounter this issue where some interviewees provide more information compared to others. A bigger sample size would probably have enhanced the reliability of the research.

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## Appendix A Data

Row Labels	Sum of Annual Transactions	Sum of Average Daily Transactions
2009	10,444	89.26495726
2010	59,776	489.9672131
2011	629,649	5,203.710744
2012	2,757,163	22,599.69672
2013	6,603,411	54,126.31967
2014	8,459,932	69,343.70492
2015	15,158,921	125,280.3388
2016	27,641,403	276,043.9417
2017	35,108,520	287,414.3598
2018	27,272,516	287,330.2132
2019	89,373,746	314,539.1993
2020	37,559,517	305,841.7108
2021	13476262	299472.4889
<b>Grand Total</b>	<b>264111260</b>	<b>2047774.917</b>

Table 1 Annual Transactions and Average Daily Transactions of the Bitcoin Network (Blockchain, 2021)

Row Labels	Sum of estimated-transaction-volume-usd
⊕ <28.08.2010	
⊕ 2010	\$ 435,620.47
⊕ 2011	\$ 135,383,060.09
⊕ 2012	\$ 272,561,330.05
⊕ 2013	\$ 5,352,944,595.41
⊕ 2014	\$ 8,858,860,172.51
⊕ 2015	\$ 9,803,978,724.85
⊕ 2016	\$ 19,854,189,469.09
⊕ 2017	\$ 128,787,267,617.84
⊕ 2018	\$ 130,540,965,601.75
⊕ 2019	\$ 123,151,097,382.23
⊕ 2020	\$ 213,536,998,939.89
⊕ 2021	\$ 289,534,659,445.85
<b>Grand Total</b>	<b>\$ 929,829,341,960.02</b>

Table 2 Total Annual U.S. Dollar Value of All Bitcoin Network Transactions (Blockchain, 2021)

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Date	BTC Suppl	BTC Supply Growth Rate	
Year	BTC Suppl	BTC Supply Growth Rate	BTC 5 year moving average
04.01.2010	1650150		
02.01.2011	5037850	205.296%	
01.01.2012	8007600	58.949%	
03.01.2013	10624025	32.674%	98.97%
01.01.2014	12202600	14.859%	35.49%
01.01.2015	13672225	12.044%	64.76%
02.01.2016	15033900	9.959%	25.70%
03.01.2017	16080400	6.961%	15.30%
02.01.2018	16777438	4.335%	9.63%
01.01.2019	17456275	4.046%	7.47%
01.01.2020	18135275	3.890%	5.84%
03.01.2021	18589356	2.504%	4.35%
01.01.2022	18888972	1.612%	3.28%
01.01.2023	18898950	1.038%	2.62%
01.01.2024	18904083	0.668%	1.94%
01.01.2025	18906535	0.430%	1.25%
01.01.2026	18907551	0.277%	0.80%
01.01.2027	18907972	0.178%	0.52%
01.01.2028	18908146	0.115%	0.33%
01.01.2029	18908219	0.074%	0.21%
01.01.2030	18908249	0.048%	0.14%
01.01.2031	18908261	0.031%	0.09%
01.01.2032	18908266	0.020%	0.06%
01.01.2033	18908268	0.013%	0.04%
01.01.2034	18908269	0.008%	0.02%
01.01.2035	18908269	0.005%	0.02%
01.01.2036	18908270	0.003%	0.01%
01.01.2037	18908270	0.002%	0.01%
01.01.2038	18908270	0.001%	0.00%
01.01.2039	18908270	0.001%	0.00%
01.01.2040	18908270	0.001%	0.00%

Table 3: BTC projected supply growth rate 2020-2040 (own estimates)

Location	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040 Total	
Japan	1.987%	3.913%	3.825%	3.788%	3.747%	3.697%	3.646%	3.558%	3.455%	3.391%	3.290%	3.394%	3.582%	3.766%	3.932%	4.082%	4.237%	4.405%	4.553%	4.729%	75%
UK	6.578%	7.494%	7.224%	7.064%	7.227%	7.493%	7.780%	8.035%	8.265%	8.286%	8.468%	8.779%	9.299%	9.758%	10.202%	10.877%	11.627%	12.349%	13.205%	14.136%	184%
US	6.757%	7.267%	7.515%	7.774%	8.052%	8.373%	8.728%	9.151%	9.617%	10.115%	10.713%	11.422%	12.084%	12.846%	13.776%	14.920%	16.190%	17.636%	19.379%	21.568%	234%
Euro Area	5.487%	7.738%	7.628%	7.546%	7.512%	7.499%	7.457%	7.473%	7.500%	7.569%	7.735%	7.894%	8.078%	8.317%	8.618%	8.961%	9.375%	9.830%	10.338%	10.895%	163%
Gold	0.282%	0.318%	0.378%	0.477%	0.588%	0.706%	0.819%	0.989%	1.111%	1.042%	1.148%	1.198%	1.191%	1.319%	1.423%	1.169%	1.028%	1.088%	1.266%	1.019%	19%
Bitcoin	2.504%	1.612%	1.038%	0.668%	0.430%	0.277%	0.178%	0.115%	0.074%	0.048%	0.031%	0.020%	0.013%	0.008%	0.005%	0.003%	0.002%	0.001%	0.001%	0.001%	7%

Table 4: Projected BTC and national currency growth in % (OECD, 2021)

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## Appendix B Interviews

### Interview Protocol

#### **Tell me a little bit about yourself...**

Q.1: What is your position in the company you work for?

Q 2: What is your area of responsibility?

Q 3: How long have you been working in the company?

Q 4: Have you only worked within this field during your time at the company? Q 5: Do you have any previous experiences related to the topic?

Q 6: Do you have any academic background related to this field?

Q 7: Is there anything you would like to add?

#### **Tell me a little bit about the company...**

Q 8: What is your company's business activity and where is it operating?

Q.9: How many employees does your company have?

Q 10: What was the past years turnover of your company?

Q 11: What are the core operations of your business?

Q 12: Is there anything else you would like to add in regards to your company?

#### **Transition Questions**

Q 13: Are you comfortable so we can start the interview?

Q 14: In the last 12 months have you been involved in any type of cryptocurrency processes? And If so, could you please elaborate in what kind of cryptocurrency you were interested in?

#### **Main Questions**

##### **Currency:**

Q.1: How would you define currency and would you define bitcoin as a currency?

Q.2: What is money in your opinion?

Q 3: What is the main difference between traditional currency and bitcoin?

Q 4: What do you think are the costs of implementing bitcoin payments instead of paper money payments?

Q 5: What differentiates Bitcoin from other cryptocurrency and gold or paper money?

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**Bitcoin:**

Q 6: What do you think are the advantages and disadvantages of bitcoin?

Q 7: Would you in the current state of crypto currency be willing to lend, borrow or trade with Bitcoin? If not, do you see it as a possibility in the future?

Q 8: What is the company you represents position and views of bitcoin?

Q 9: What is the future of Bitcoin in your regard and how can that affect your company? Q

10: What are your misconceptions about Bitcoin?

Q 11: Do you know the stock-to-flow model and if so what do you think about it?

**Inflation & Current economy**

Q 11: How are you looking at inflation right now?

Q 12: Thoughts on inflation & Bitcoin payment opportunities?

Q 13: What do you think is the impact of Bitcoin on the global economy?

Q 14: There's some serious debasement happening and there's a lot of printing taking place. Why is sound money important from that particular point of view and do you think printing more money is good for the economy and inflation?

Q 15: What problem do you think Bitcoin could be intended to solve for the economy?

**Risk & Limitations:**

Q 16: Do you see any risks with a decentralized currency like Bitcoin?

Q 17: What do you think are the main risks and limitations your company is facing when adopting Bitcoin as a new currency?

Q 18:: How would you reduce risk exposure when using cryptocurrency? How would you apply risk mitigation?

Q 19: Thoughts on the governments' ability to shut down Bitcoin?

Q 20: How is Bitcoin not going to be hacked like everything else? Or how is a hacker not going to bring down the network?

**Closing Questions:**

Q 21: Do you have any further questions regarding the interview?

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Interviews

Interview A

Interview with the tech company representative. Interviewed by Filiph Jönzén through Zoom on the 21 of april 2021 at 10:00. Language: English. Length: 68 minutes.

### **Introduction questions**

**Tell me a little bit about yourself...**

**Q.1: What is your position in the company you work for?**

I work within the multi party systems and blockchain practise. As a subgroup to this entity that I work for, I work with financial infrastructure, more specifically CBDC, which is central bank digital currencies, digital assets and custody.

**Q 2: What is your area of responsibility?**

I would say then, leading back to what I said, we work within the financial infrastructure and my responsibilities would then be CBDC, digital assets and custody. If you look on a deeper level it is technical and business oriented.

**Q 3: How long have you been working in the company?**

Roughly two years. One year and 10 months exactly.

**Q 4: Have you only worked within this field during your time at the company?**

No, I worked the first four months with applied intelligence. It is dealing with AI and machine learning and data analytics, then I swapped over.

**Q 5: Do you have any previous experiences related to the topic?**

Yes, i started studying blockchain around 2015 and then it accelerated in 2017 when i took a lot of courses related to the subject. I do not have any previous working experiences.

**Q 6: Do you have any academic background related to this field?**

Yes and no, I do not have anything included in my bachelor thesis but I do have certificates within blockchain and DLT technologies and I have done 5 courses which I get credit for within blockchain.

**Q 7: Is there anything you would like to add?**

No, nothing I can think of right now.

**Tell me a little bit about the company...**

**Q 8: What is your company's business activity and where is it operating?**

We operate across the whole globe. The company is massive and we do almost everything

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around consulting. I would say we are most consulting services but we do have some products but i cannot say that we are a product company. We do consulting in every kind of business you can imagine.

**Q.9: How many employees does your company have?**

We are a little bit above half a million, more specifically around 550 000 employees and we are around 1 300 employees in Sweden.

**Q 10: What was the past year's turnover of your company?**

They did release the Q2 result where the profit was 7 billion dollars. Then again the profits go up and down and the result this year could be different. For the past year due to the pandemic our results were below the average.

**Q 11: What are the core operations of your business?**

Technology and implementation I would say is the main business. But then again, we do everything from strategy to operations. Everything in every industry. But I would say mainly technology and implementation and that is what strives for our revenue.

**Q 12: Is there anything else you would like to add in regards to your company?**

No, nothing right now.

### **Transition Questions**

**Q 13: Are you comfortable so we can start the interview?**

Yes.

**Q 14: In the last 12 months have you been involved in any type of cryptocurrency processes? And If so, could you please elaborate in what kind of cryptocurrency you were interested in?**

Yes and no, not any implementation within my occupation. We do however work with that within custody and custody of crypto assets, nothing I can share with you sadly. I have however had experiences during my free time. I am in my free time working on the etherium space and I am building smart contracts, coding smart contracts. I am building my own NFT's, building my own tokens and just expanding my knowledge around that. So nothing around Bitcoin specifically but i have experiences from the crypto space.

## Main Questions

### Currency:

#### **Q.1: How would you define currency and would you define bitcoin as a currency?**

Good question, I would say that a currency is something that is quite stable and serves as a means of payment between goods or commodities that every person finds valuable and used for any purpose. It is rough when it comes to if Bitcoin can be seen as a currency. A lot of different economists have driven this topic and compared it to both gold and other stuff. First of all, Bitcoins volatility kind of defines what I just said. That a currency should be quite stable. And Bitcoin is as we know quite volatile so that kind of fundamentally defies it as a currency. It is then a commodity? I do not know. I mean, the value keeps going up compared to other means of payments out there. A bitcoin could be used to buy a lot of things, but does that make it a currency? I am further not convinced what kind of asset Bitcoin could be. Is it more similar to traits of a stock that you can trade and hope for it to go up, i mean people purchase stocks that do not even give dividends and they do this on the sole purpose that the company would gain value. Does that make Bitcoin more similar to the traits of stock? As you understand i do not have a good answer to what Bitcoin exactly is, i think it will find its role. It is hard to define and I think the community is divided on this. I am not convinced yet whether I think it is a derivative, a commodity or a currency. I think it has traits for everything.

#### **Q.2: What is money in your opinion?**

That kind of leads back to what I referred to in the previous question. What is money, it is made up. Money is basically accounting on two ends. Money goes way back as well where we tried to make it easier by trading commodities, I have a banana and you have goats. I want bananas but you do not want goats so we found this intermediary thing that we know has the same value for everything we trade on a wider scale. And that system has stuck with us to this day. If Bitcoin then can service this function? I mean yes, we have seen people trade with Bitcoin where they have bought pizza with Bitcoin. It can definitely be an intermediate function of trades.

#### **Q 3: What is the main difference between traditional currency and bitcoin?**

Right, uhm. Traditionally currencies go way back. If we are thinking about fiat currencies today, I would say that the main difference is that they are backed by a central bank. But this is not entirely true, at least not in Sweden where digital money is held by commercial banks and is not directly backed by the government. But if we are thinking about physical bank

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notes, they are backed by the government. Bitcoin is certainly not since it is fully decentralized. It is also, as we touched on before, very volatile. There are also differences in transaction fees etc being dynamic and if we are comparing it to paper money there is a massive difference in that one is physical and one is not. They have similar traits but they are also quite different.

### **Q 4: What do you think are the costs of implementing bitcoin payments instead of paper money payments?**

Well, the basic idea of bitcoin and the costs associated with it are not really that high. What they have done with Bitcoin is that they have tried to tie an online identity to a physical resource. In theory, the whole Bitcoin network could run on just a few nodes and consume very little energy. The problem with Bitcoin is that there is a financial incentive to mine and to win the next block, and that is a kind of cost competition. The more computational power you have the higher the chance is to winning and that is why you see that the competition in the market caused the network to kind of go out of hands with the current algorithms and that is why it consumes a lot of energy for example even tho it does not necessary have to. But since it is tied with a finite resource, being CPU and GPU power, that kind of spiraled out of hand. I mean, Bitcoin can definitely function, we have seen that specifically with a pre for work algorithm even though the energy consumption is massive. It can however definitely be implemented and the costs will probably vary depending on how many nodes run the network and if we have the competition of fighting for the transaction fees. Right now for Bitcoin, if we talk about costs specifically, you get Bitcoin for mining new blocks and you also have transaction costs. The big incentive right now is to create the next block since they get Bitcoins out of it. But during the twenty one hundred, we have reached the cap of bitcoins in circulation, then the only incentives for miners would be the transaction fees and then the transaction fees will go up. There are costs associated with the network, both in and also of course outside, especially the energy consumption and how that will play out when the block bonus you get is eliminated.

### **Followup question: As you mentioned, you can not see Bitcoin as a currency, but if you want to implement Bitcoin as a currency. What would you have to do in order to make it feasible as a currency and what would that cost?**

For widespread adoption, and I guess what you are aiming for here is how we can replace what we currently pay with in stores etc. First of all, it is a very technical thing. It is a hurdle to start using it and the use cases are not that big as of yet. I think PriceWaterhouseCoopers

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made their first payment in Bitcoin, i think on the fourth of april, which was big news. Big actors like Tesla allow the purchase of cars with Bitcoin. Big banks like bank of new york and JP morgan are also looking into the space and making big investments. But for Bitcoins to be used in a widespread manner, you need to accept payments in local convenience stores and small vendors. It is not impossible to do it, today we have mastercard and visa and Bitcoin kind of needs the same structure as they have where you need for example terminals that can process the transactions. The costs associated with that... i have no clue. They will be massive.

### **Q 5: What differentiates Bitcoin from other cryptocurrency and gold or paper money?**

Most definitely, they have a lot of different traits. For example, if we look at the biggest two, they are quite different. Bitcoin is based on something called the UTXO model, “the unspent transaction output” where you kind of wrap the token, or the money in the token. Ethereum is completely different where you have programmable money where you can have logic on chain and can write smart contracts. The money is on an account kind of structure where Bitcoin is wrapped and you tokenince it. Ethereum has an account structure, similar to what we have today. So yes, they are different.

### **Bitcoin:**

### **Q 6: What do you think are the advantages and disadvantages of bitcoin?**

I think Bitcoin in itself has some challenges in terms of scalability. There is a famous trilemma called the blockchain trilemma where you have to pick two out of the three which are decentralisation, security and scalability. Given what the cypherpunk community tries to develop is based on decentralization and the aspect of security is needed because without the security a financial system will never work. This kind of leaves scalability to be the one missing out. There is also a finite space of data that you can put in one block of Bitcoin, i think it is one or ten megabytes of data. They have tried to increase this over the years and they have probably increased the capacity. This means one average that you can put between one thousand to three thousands transactions into one block. One block in Bitcoin is created in around 10 minutes. That means if we have 10 minutes per block and around three thousands transactions that we have a TPS (transactions per second) of around 3 to 5. That is quite slow compared to visa and mastercard. They have been trying to optimize this with the so-called lightning network where you kind of open off chain or side chain steams. This means that you and i can open a side chain where we perform transactions between ourselves every day and when we feel happy and done we just communicate that as one transaction to

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the chain which means that the transaction between you and i goes really quick. The blockchain trilemma is not unique to just Bitcoin but can be applied to other currencies as well. But i think that the trilemma is bigger for Bitcoin specifically since Bitcoin has the purpose of holding value or payments where other currencies, for example Ethereum has other purposes as well like having programmable money. There are also upsides with Bitcoin however, i mean payments do not have any geographical constraints, you can process a Bitcoin transaction from anywhere in the world. You do not need a full node to operate, and by that i mean that you do not need to download the block to your device. It is enough to have what they call a lightweight node. You basically just get the hashes of the block, which is minimal. You can then just send the hashes to multiple nodes and they can verify that everything is correct. This is on a security aspect dangerous because if you connect to malicious nodes they can kind of alter this to show that you have not made a payment for example. Also, depending on what kind of transaction it is, it could be quicker. I mean, purchasing a coffee for example would not be the best thing to do on the network since the transaction fee would probably be bigger than the cost of the coffee itself and the time for the transaction fee would probably take longer than 10 minutes. Were as if you would make payments regarding funds could take days in traditional ways but with Bitcoin it could be done much quicker.

### **Q 7: Would you in the current state of crypto currency be willing to lend, borrow or trade with Bitcoin? If not, do you see it as a possibility in the future?**

I have no problem with trading with Bitcoin. I would probably not borrow Bitcoin, i do not see any direct use case for me personally why i would need to borrow. Also, for borrowing I would probably have to put in some collateral and pay an interest fee so i do not see the purpose of that. If I owned Bitcoin I could see myself lending Bitcoins for a fee.

### **Followup question: Could you see the possibilities increasing to borrow Bitcoin in the future?**

I would say for Bitcoin yes, to some extent. Maybe not only Bitcoin. There is actually a big space to this, called DeFi (decentralized finance) and there is tons of applications that is built on this space, but that is mainly on the Ethereum space since Bitcoin is limited to what it can do, it is just tokenice money where on Ethereum you can have programmable logic. In the Ethereum space you have a lot of financial applications where you can lend money, borrow money, you can stake money, you have a lot of different financial risk applications where you can buy insurances etc. They have, however, a lot higher interest rates compared to

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traditional finance, if you have your money in a regular bank you get 1% whereas some DeFi applications have 8-10% in interest rates. This Ethereum space of defi actually has a lot of applications that accept a pegged version of Bitcoins, they have WBTC and XBTC which are tokens on the Ethereum blockchain which represents the same amount in Bitcoin. They also have something called DEX, which is decentralised exchanges that they are building. There are also centralised exchanges like kraken, coinbase etc which are operating in the DeFi space. The Ethereum space is a starter and I think there will be more platforms providing DeFi. I guess to kind of answer the question, Bitcoin can be traded on some of thies platform, either as a tokenized format or pegged to the underlying bitcoin value.

### **Q 8: What is the company you represent, position and views of bitcoin?**

My company is so big so i can not speak for the entire company but i can speak for my division which consists of 100 employees worldwide.

This space is divided into two things, you have the corporate side of things with permissioned blockchain and then you have the permissionless side which we have talked about today. We do not really operate on the permissionless side, we instead deal with corporate blockchain such as “Hyperledger”, it is an initiative with fabric, sawtooth and besu. We are dealing with R3 Corda, which is a financial permission ledger. Of course we have expertise within the permissionless and what is happening there but we do not directly operate there. The company in that sense does not have any strong opinions on crypto currencies, we know what it is and how it works but we are working on the other side of the coin. It is based on the same thing but it is another thing. I would not say that the company has any stance in this question specifically.

### **Q 9: What is the future of Bitcoin in your regard and how can that affect your company?**

No answer based on the interviewees limitation of speaking for the company as a whole.

### **Q 10: What are your misconceptions about Bitcoin?**

First of all, i think people do not understand it and also when you are speaking about blockchain as an example, people think Bitcoin. But really, it is two separate things, i mean just because there is blockchain does not mean it is Bitcoin. There are a lot of applications that are based on blockchain that are not specifically Bitcoin. I think they are tightly coupled together since it was the first kind of blockchain ever to be built, but this is maybe a misconception about blockchain rather than bitcoin. I also think that the main thing is that people do not understand and know how it works. There is a lot of hype and money going into it without really knowing what it actually is.

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**Followup question: Could you see those limitations you mentioned as a limitation of Bitcoin becoming a currency?**

I think people would have to understand it better for it even becoming a currency. Then again, the technology is quite complex to understand and you need to make it easier to understand it if you want widespread adoption. There are however bigger technical limitations that were mentioned before in the interview.

**Q 11: Do you know the stock-to-flow model and if so what do you think about it?**

No, I have never heard of it.

The questions were therefore skipped.

**Inflation & Current economy**

**Q 11: How are you looking at inflation right now?**

Fiat currencies today do fluctuate, depending on export and import, printing of money etc and everything affects the underlying value of the fiat currency. Then if Bitcoin is as volatile as it is, is it really a good option? Then again if you would use it as a currency, it would be mental to either buy or sell with the currency since one day the Bitcoin could be worth a lot more or worth a lot less. That is kind of a problem since it does not comply with fundamental economic principles. In regards to inflation however, Bitcoin is finite which means you will never be able to add liquidity to the system.

**Q 12: Thoughts on inflation & Bitcoin payment opportunities?**

I do not think the increase in price has that big of an impact since Bitcoin can be divided into a satoshi, which is 10 to the power of 8 which makes the Bitcoin really small. This makes it similar to a currency and money since no matter the price you will still be able to use it. As of today, i do not see the high price as a problem.

**Q 13: What do you think is the impact of Bitcoin on the global economy?**

It most certainly had an impact, especially on the recent hype. I think that it is prompted by banks and authorities etc to look at it because they feel maybe threatened or that they need to know what it is. As more and more people lean towards using it, that kind of puts pressure on the fiat currencies and whoever is behind that, which is mainly the central banks. Another impact on what it has is leading back to what i said earlier, is it a commodity, is it a currency, is it digital gold? However, it prompted investors to diversify their portfolios which of course have an impact if they start investing. But then again, is it really an asset? I would say they are the biggest one.

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**Q 14: There's some serious debasement happening and there's a lot of printing taking place. Why is sound money important from that particular point of view and do you think printing more money is good for the economy and inflation?**

This question was skipped due to time constraints as well as it was answered in other questions.

**Q 15: What problem do you think Bitcoin could be intended to solve for the economy?**

I would say that this question is kind of leaning more towards different geographical parts of the world. I would not say that if we look for Sweden, we are not really solving any problems. The cypherpunk community are people that do not like to be centrally managed and they do not like to obey centralized entities like the government. That is kind of the origin of Bitcoin. I would not say that we have an issue of trust in Sweden, which it might be in other countries like Zimbabwe or other countries in Africa where there is little to no trust in the government where there is a lot of corruption. In that sense, a decentralized solution where you rather put your trust in math and logic rather than in bureaucracy could be one thing. This varies a lot however from country to country. The second part is the availability to pay, so in Sweden we have a quite robust financial infrastructure in place. We are one of the most technologically advanced countries, I would claim and we have the lowest cash usage at about 2% as other technical countries like Singapore where the cash usage is about 40%. In that sense, we do not have the need for a system like Bitcoin since we do not have low trust in our banks and government and there is no need for this financial infrastructure since we have solutions to conduct payments in a good way. These two factors are what we have to look at here and that is different depending on geographical reasons as well as the two reasons stated above.

### **Risk & Limitations:**

**Q 16: Do you see any risks with a decentralized currency like Bitcoin?**

There is an obvious censorship risk where actors within the community can choose to not include your block or never work on a block that includes someone's transactions, which is kind of a censorship attack. This could lead to other miners also stop including your transactions since I will never mine on them and they are then likely to miss out on Bitcoins since I might find the next block faster than them or I can hide blocks etc. There is also the 51% network attack where you take over the network if you control more than 50% of the mining power. There are also malicious nodes, fork attacks etc. There are plenty of

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technological risks associated with it. Financial risks are of course the volatility. There are also risks in storage. You can store Bitcoins and other currencies in different ways, you can store it in something that is called a hot wallet. And that is a wallet that is completely online. Bitcoin is using cryptography and public and private keys. The private key is kind of the key to the money. If you lose your private key you lose all your money. If the key is hacked you also lose all your money. Hot wallets are therefore a security risk. You can also have something called a cold storage which is harddrives where you can store your key on. If you lose this harddrive you lose your money. You can also store your key on a piece of paper but if your house burns down you lose your money. You can also store it in something called a mnemonic. This is a phrase of around 10 to 15 words that you memorize in your head. When you mash these random words into an algorithm you get your key. This is the safest way I guess but you can still lose it if you forget the words. We looked at a lot of risks in terms of the network and procedural risk, financial risks and the stability and the operational risks of storage.

### **Q 17: What do you think are the main risks and limitations your company is facing when adopting Bitcoin as a new currency?**

Questions were not asked since the ability to answer the question is limited.

### **Q 18: How would you reduce risk exposure when using cryptocurrency? How would you apply risk mitigation?**

There are ways to mitigate the technical risks and the operational risks that I talked about before. You can for example have your key in a USB drive that has a hardware secure model that keeps it secure from any external threats. When you then try to make a transaction it has to go through this secure model. This however means that if you use that hardware the transactions take longer since you have to plug it into your computer and cannot do transactions through your phone.

### **Q 19: Thoughts on the governments' ability to shut down Bitcoin?**

We have seen China kind of being reluctant to crypto currencies and trying to ban it but they have not even closely succeeded since the use of crypto currencies is big in China. This also kind of touches upon what we talked about before in the interview that there is an incentive in some parts of the world to launch their own CBDC (central bank digital currency). They have now launched this on a small scale to try and see how the public reacts. I do not think that they can completely ban it. It is a hard question to answer. There are not many examples of countries trying to ban it. It is hard to stop it at the end since it is hard to stop someone from having a computer and having an internet connection. People can always use a VPN. I instead

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think that the government's ability to “shut down” is to do as China is doing and create their own currency that is having the same purpose.

**Q 20: How is Bitcoin not going to be hacked like everything else? Or how is a hacker not going to bring down the network?**

There is always a risk but as i have talked about before it could be managed by different storage possibilities.

**Closing Questions:**

Q 21: Do you have any further questions regarding the interview?

No, best of luck with the thesis.

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Interview B

Interview with the bank representative. Interviewed by Filiph Jönzén through a phone call on the 23 of april 2021 at 14:00. Language: Swedish. Length: 36 minutes.

### **Introduction questions**

**Tell me a little bit about yourself...**

**Q.1: What is your position in the company you work for?**

I work as a market analyst.

**Q 2: What is your area of responsibility?**

I work within capital management with focus on macroeconomics and financial market analysis.

**Q 3: How long have you been working in the company?**

I have been working at the bank for 21 years.

**Q 4: Have you only worked within this field during your time at the company?**

Yes, I have.

**Q 5: Do you have any previous experiences related to the topic?**

I have previously worked at another bank within the same area of responsibility.

**Q 6: Do you have any academic background related to this field?**

I hold a bachelor of business administration from Lund University.

**Q 7: Is there anything you would like to add?**

No.

**Tell me a little bit about the company...**

**Q 8: What is your company's business activity and where is it operating?**

It is three things. It is bank, life insurance and non-life insurance.

**Q.9: How many employees does your company have?**

Around 600.

**Q 10: What was the past year's turnover of your company?**

Around 2 billion SEK.

**Q 11: What are the core operations of your business?**

As is stated before, Bank, life and non-life insurance.

**Q 12: Is there anything else you would like to add in regards to your company?**

No.

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## Transition Questions

**Q 13: Are you comfortable so we can start the interview?**

Yes.

**Q 14: In the last 12 months have you been involved in any type of cryptocurrency processes? And If so, could you please elaborate in what kind of cryptocurrency you were interested in?**

No.

## Main Questions

### Currency:

**Q.1: How would you define currency and would you define bitcoin as a currency?**

I would define a currency as a means of payment and as a possibility to store value. I would therefore not define Bitcoin as a currency since I believe that the only benefit Bitcoin has is as a means of investing where I hope to sell it for more than I bought it for. There is however no store of value since the fluctuation of Bitcoin is too high. I also do not believe Bitcoin to be a good means of payment since the acceptance rate of Bitcoin overall is too low as well as the liquidity. Money for me is something that everyone accepts as a payment and does not fluctuate too much, which I believe Bitcoin lacks.

**Q.2: What is money in your opinion?**

It is similar to my reasoning in the first question. I believe that money is something that almost everyone accepts as a means of payment, does not fluctuate too much in value and does not have high transaction rates. This is money for me and I believe that Bitcoin lacks all of those characteristics.

**Q 3: What is the main difference between traditional currency and bitcoin?**

The biggest difference I would say is the liquidity as well as the possibility to exchange. I would for example go to a lower developed country and no one accepts Bitcoin as payment, i would probably not be able to exchange my Bitcoins to the local currency in an easy way. The fluctuation is also present in fiat currencies but it is no way near the volatility of Bitcoins. I also find it impractical to use Bitcoins. This can for sure change in the future but as of today i find it very impractical. I cannot walk down to the local convenience store and pay with Bitcoin or almost never be able to buy a new car with Bitcoin.

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**Q 4: What do you think are the costs of implementing bitcoin payments instead of paper money payments?**

I believe that the costs of using Bitcoin as a new currency is the energy costs of mining new Bitcoins. There are also big costs associated with the loss of Bitcoin. I have heard that almost one fifth of all Bitcoins that have been mined has been lost. This is due partly because of governmental actions from specifically China and the USA. One example of this is in the USA where there was a big amount of Bitcoins controlled by criminals that were confiscated by the government. In China, the government has shut down mining sites and Bitcoins were as a result of this Bitcoins were lost. There has also been a loss of Bitcoins due to users forgetting their account information or security codes. There have also been thefts of Bitcoins, especially in Japan and Korea where criminals have stolen Bitcoins from users. This is however costs not associated with administrative expenses but rather other types of risks associated with Bitcoins and crypto currencies.

**Q 5: What differentiates Bitcoin from other cryptocurrency and gold or paper money?**

I can not see any difference between Bitcoin and any other crypto currency. I can however see a difference between Bitcoin and gold for example. One of the more prominent advantages of gold is that it is physical, where you can show that you have it and you can trade it over physically. Gold is also internationally acceptable as a payment method. I would say that gold is the most accepted currency. Even in a state of war or social collapse, gold could function as a means of payment to for example pay for a ticket out of the country or to bribe a soldier. Imagine that you are fleeing a war torn country and fleeing out of the country, do you believe that you could get anywhere if you wanted to pay with Bitcoin. I doubt it, you would instead probably get somewhere if you want to pay with gold. In regards to paper money, i would say it is similar to gold. The usage is maybe not as usable anywhere as gold is but the volatility is as low as gold compared to Bitcoin.

**Bitcoin:**

**Q 6: What do you think are the advantages and disadvantages of bitcoin?**

I have mentioned some disadvantages of Bitcoins in my answers before. I can not see any advantages of Bitcoin. I can see advantages for criminals or other people who have to hide their transactions in a dictatorship for example.

**Q 7: Would you in the current state of crypto currency be willing to lend, borrow or trade with Bitcoin? If not, do you see it as a possibility in the future?**

The answer is no.

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**Followup question: Could you see it happening in the future?**

Possibly, in a far future. The volatility needs to be similar to other currencies and the transaction costs need to be lower for me to trade, borrow or lend with Bitcoin. Widespread usage also needs to be adopted in order for that to happen in my opinion.

**Q 8: What is the company you represent, position and views of bitcoin?**

The company does not have any opinion on Bitcoin.

**Q 9: What is the future of Bitcoin in your regard and how can that affect your company?**

I do not have an answer to this question.

**Q 10: What are your misconceptions about Bitcoin?**

That is it only valuable for criminals as well as people of oppression for example. It is also easy to lose your Bitcoins and they are hard to trade with.

**Q 11: Do you know the stock-to-flow model and if so what do you think about it?**

I do believe that the comparison between gold and other metals is halting because, if we take gold that has the highest ratio. Gold has a stock as well as flow but it also has other usage within for example jewelry but as well as technological solutions. This is not anything that Bitcoin has. I do not believe that you can take something and limit the flow of that specific thing and then say that you have some sort of value. I am certain that the stock to flow model works for metals and other raw materials but i do not believe that the model is applicable to Bitcoin specifically.

**Inflation & Current economy**

**Q 11: How are you looking at inflation right now?**

It is right now low, but rapidly increasing. Partly because of technical reasons, that is the base effect where the inflation was so low in previous years and when you measure now you get higher results. I believe that the inflation, and we are talking about the US, will rapidly increase and will top in about half a year at around 3-4% and then would lower again to a lower acceptable level.

**Q 12: Thoughts on inflation & Bitcoin payment opportunities?**

I do not see any connection with Bitcoin and inflation. As long as Bitcoin has the volatility as it has now, I do not find Bitcoin to fill any role, either in regards to inflation or any other function. I cannot use Bitcoin as a measure of payment if it can increase in value of more than 50% in one day. That minimizes the usage of Bitcoin. Imagine yourself if i bought a car

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from you and you requested 100 000SEK of Bitcoin, but the day after the value of the Bitcoins that you got only amounted to 50 000SEK.

**Q 13: What do you think is the impact of Bitcoin on the global economy?**

I do not find any impact of Bitcoin on the global economy. There are however indirect impacts of Bitcoin because it takes away the monetary leverage from the central bank, which of course is the reason behind Bitcoin. I do however think that this is negative. I also believe that Bitcoin aids criminals and the funding of terrorist organisations where the tracing of money is harder to do. I do not see it as a coincidence that criminals were the fastest to adopt Bitcoins. So I actually believe that Bitcoin has a negative impact on the global economy since Bitcoin takes away the central banks ability to affect the economy.

**Q 14: There's some serious debasement happening and there's a lot of printing taking place. Why is sound money important from that particular point of view and do you think printing more money is good for the economy and inflation?**

I believe that there is a risk in printing too much money. We have seen it in Germany in 1923 as well as Zimbabwe. There are numerous examples of risks of printing too much money around the world. But in some crisis it could be a solution to an aggressive deflation spiral by the central bank in order to avoid disaster.

**Q 15: What problem do you think Bitcoin could be intended to solve for the economy?**

One solution I can think of is for people under oppression. One example of this could be during the Sovjet union, and there were a big resistance, they could have had use of this decentralized means of payment.

### **Risk & Limitations:**

**Q 16: Do you see any risks with a decentralized currency like Bitcoin?**

For the foremost, it benefits criminals. The currency could also be manipulated by governments, for example China. I do also believe that Bitcoin can benefit the funding of terror organizations. I mean more specifically the anonymity as well as the encrypted communication. One example of this could be found in encrochat. I believe that society is now increasing their work against money laundering as well as terror funding. One way around this could then be to use Bitcoins or other crypto currencies that the society cannot reach. This is a risk, at least for me. I do not see the central bank as a risk to society, I rather see it as a benefit in regards to keeping an eye on the economy. I have been in this market for many years and I have never found any reasons as to why you would need to eliminate the central bank's role.

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**Q 17: What do you think are the main risks and limitations your company is facing when adopting Bitcoin as a new currency?**

As I have said before, the risks are the volatility and the benefits it has for criminal activity.

**Q 18: How would you reduce risk exposure when using cryptocurrency? How would you apply risk mitigation?**

First and foremost to not use Bitcoin, to not accept Bitcoin as a payment in the near future. I would instead suggest to wait and see the development and then act when you notice where the market is heading.

**Q 19: Thoughts on the governments' ability to shut down Bitcoin?**

This is similar to previous answers to other questions. It is a risk for those who trade and invest with Bitcoin that governments can shut down or affect the markets.

**Q 20: How is Bitcoin not going to be hacked like everything else? Or how is a hacker not going to bring down the network?**

I actually talked about this a few years ago in a podcast. I do not believe that a hacker can bring down the network, i think that the system is too robust to that but i think that hackers can bring down certain wallets or people who own the wallets and steal or confiscate the Bitcoins. I therefore believe that the user can be hacked but not the system as a whole.

**Closing Questions:**

**Q 21: Do you have any further questions regarding the interview?**

No. I have said what I was planning to say.

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Interview C

Interview with the construction company representative. Interviewed by Filiph Jönzén over Microsoft Teams on the 29 of april 2021 at 13:00. Language: Swedish. Length: 51 minutes.

### **Introduction questions**

**Tell me a little bit about yourself...**

**Q.1: What is your position in the company you work for?**

My position is divisional controller within the division of construction.

**Q 2: What is your area of responsibility?**

You could say that I am responsible for the economy with the business division.

**Q 3: How long have you been working in the company?**

I have been working here for 16 hours and three months.

**Q 4: Have you only worked within this field during your time at the company?**

I have always been working with economics, but in the last five years have had the title and responsibilities I have now.

**Q 5: Do you have any previous experiences related to the topic?**

I have been working as a division controller without responsibility. I have also had accounting responsibilities etc. I also worked some time in the financial department. I have also been working at a hotel and real estate company as responsible for the economy.

**Q 6: Do you have any academic background related to this field?**

I hold a bachelor in business administration.

**Q 7: Is there anything you would like to add?**

No, nothing I can think of right now.

**Tell me a little bit about the company...**

**Q 8: What is your company's business activity and where is it operating?**

The company is operating within Sweden, Norway and Finland. We are working with construction, mostly bigger contract building, for example hospitals, bridges, roads etc.

**Q.9: How many employees does your company have?**

The division has around 6 000 employees.

**Q 10: What was the past year's turnover of your company?**

It is around 27 billion SEK for this division.

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**Q 11: What are the core operations of your business?**

Construction contracting.

**Q 12: Is there anything else you would like to add in regards to your company?**

There is a lot to add in regards to the company, but you feel satisfied we can hold there.

### **Transition Questions**

**Q 13: Are you comfortable so we can start the interview?**

Yes.

**Q 14: In the last 12 months have you been involved in any type of cryptocurrency processes? And If so, could you please elaborate in what kind of cryptocurrency you were interested in?**

I would say no to this question. I would however like to add that we had an outstanding debt from a customer and he then asked if he could pay off his debt with Bitcoin, but we said no to that offer. The biggest reason as to why we said no were the fiscal reasons where it would get very complicated tax wise. This could also be one reason why he wanted to pay in Bitcoin since he would not need to tax.

**Followup question: Was this the first time something like this happened?**

Yes, it is very rare but it might happen more in the future.

**Followup question: Was it a bigger actor on the market who offered this?**

It was a private person who offered this.

### **Main Questions**

**Currency:**

**Q.1: How would you define currency and would you define bitcoin as a currency?**

This is a hard question, a currency is some sort of approved kind of money which can be used as a medium of exchange for services and goods. I would therefore not say that Bitcoin can be seen as a currency since i do not believe that Bitcoin meets the criteria that i just mentioned. Sure, you can sometimes pay with Bitcoin but it is never easy to do all the time. If you take a coffee for example, i would say it is hard to buy coffee with Bitcoin. The transaction takes a bit too much time. You could however buy a tesla with Bitcoin where the

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transaction speed does not really matter that much. Another disadvantage is the fluctuation of value where there is a risk that there is a new price of the cup of coffee when you have drunk it up. There are however currencies today that have the same problem, for example in venezuela. The inflation some currencies have when people do not believe in them also has this problem. This could indicate that Bitcoin is as good a currency as the currency in venezuela. As I see it it still has a bit further to go if Bitcoin wants to be treated as a traditional currency as we know it.

### **Q.2: What is money in your opinion?**

I would say that Bitcoin sometimes can be seen as money and sometimes not. Money is strongly connected to a means of payment which needs to be quick, stable and has an easy way of transferring. If we take Tesla as an example again, it is possible to pay with Bitcoin and could thus be seen as money but then again Bitcoin does not function for all transactions.

### **Followup question: Can you see Bitcoin as an investment rather than as money?**

I would say yes, I see it closer to gold rather than SEK for example.

### **Q 3: What is the main difference between traditional currency and bitcoin?**

I would say the fluctuation of Bitcoin as well as the ability to use it as a payment in a fast and easy way.

### **Q 4: What do you think are the costs of implementing bitcoin payments instead of paper money payments?**

I am no expert within this field, but if I just reason I believe that Bitcoin could become a currency in the future when it has become more accepted. If everyone believes in the system, Bitcoin could then become functional. But as it is now, not everyone believes in it and there are political factors also hindering it from becoming a currency. I would suggest that Bitcoin in the future could be more similar to a currency and as a means to invest and store value.

The cost of implementing however I would say it could be affected by the energy consumption. This is however related to the mining process and will likely get smaller in the future when the mining stops and slows down. You also need to increase the transaction time for Bitcoin to be able to function, which also likely will cost a lot of money.

### **Q 5: What differentiates Bitcoin from other cryptocurrency and gold or paper money?**

My interpretation is that Bitcoin is the most established one of all crypto currencies. The big difference between Bitcoin and gold or paper money is that I believe not everyone believes in it, which is a disadvantage for Bitcoin. Bitcoin is however the most established crypto

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currency compared to other currencies and I believe in the long run there will be fewer currencies on the market which is a benefit for Bitcoin.

**Bitcoin:**

**Q 6: What do you think are the advantages and disadvantages of bitcoin?**

One advantage Bitcoin has is that it is outside the banking system and that is not directly connected to any type of inflation. Another advantage is that in some countries, Bitcoin could be an alternative to their own currencies or to people who are under oppression. These countries could have a much higher use of Bitcoin compared to other countries like Sweden where we have more faith in the system and the government as well as that we have other functions for fast transactions like “Swish” for example. Some disadvantages are that it can fluctuate a lot in value. Another disadvantage, that also could be an advantage is the anonymity where people can use Bitcoin without having to reveal much information. This makes it harder to track who owns it which might have led to more usage of Bitcoin within criminal activities. This could have damaged the reputation of Bitcoin since it has the function of being a safe and believed currency.

**Followup question: Could the anonymity you talked about be a hindrance for you to trade with Bitcoin in the future?**

It is a disadvantage, but I do not see it as a hindrance for Bitcoin to become a currency or to trade with it. Money is to some degree also semi-anonymous which has not limited the use of it that much. It also has a disadvantage in regards to tax since I believe that the authority has problems in figuring out how to properly tax and to account for different crypto currencies fluctuations etc.

**Q 7: Would you in the current state of crypto currency be willing to lend, borrow or trade with Bitcoin? If not, do you see it as a possibility in the future?**

As of right now, my definite answer is no. I would also say no in the near future since we are a bit too traditional to trade, borrow or lend with Bitcoin. In the far future it is however not impossible, I believe that we might have to place some assets into Bitcoin or other currencies as a substitute to other investment opportunities.

**Follow up question: You said that you were too traditional for that. What do you mean by that?**

We are a big traditional company where we are not the first companies who jump on new

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technologies or opportunities. We work with traditional methods and try to do them as good and effectively as possible. The history of the company might also be stuck in the company where new start up companies might be more interested in adopting new technologies like this.

**Q 8: What is the company you represent, position and views of bitcoin?**

I think that we are quite careful and pending in regards to Bitcoin.

**Q 9: What is the future of Bitcoin in your regard and how can that affect your company?**

I believe that in the future we will be able to buy apartments for example from us. I think that some part of our assets will be placed in different crypto currencies. But this is in the far future.

**Q 10: What are your misconceptions about Bitcoin?**

I have a hard time answering for the whole company but I believe that many believe it to be problematic with the fluctuation and therefore feel an insecurity in regards to Bitcoin. I also believe that some believe that Bitcoin is only used within criminal activities. I also believe that we as a company in regards to sustainability have a misconception that Bitcoin requires a lot of energy. This could then damage our sustainability work. I do however not have any comparable information on how damaging other currencies are to the climate.

**Q 11: Do you know the stock-to-flow model and if so what do you think about it?**

I am not familiar with this model.

## **Inflation & Current economy**

**Q 11: How are you looking at inflation right now?**

I believe that we have a price increase upwards where we have a lot of stimulus measures that drive the economy. We also have rampant inflation of price of living as well as an increase on the stock market. We also have raw materials prices that are steadily rising which we as a company have to take into account. We therefore need to take this into consideration when we are securing revenue streams. A stable inflation rate is however needed to a sustainable economy.

**Q 12: Thoughts on inflation & Bitcoin payment opportunities?**

Bitcoin could be seen as some kind of security to secure a position in regards to inflation. That is one opportunity you have with Bitcoin in regards to inflation where you at the same time can generate return. The question is however if we even are in that stable position now with Bitcoin in regards to fluctuation. The risk is that you buy something now and the asset

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rises or declines a lot in value over the years. Therefore Bitcoin might not be the security towards inflation since it is not as stable as required. In the future however it could become a security towards inflation.

**Q 13: What do you think is the impact of Bitcoin on the global economy?**

I believe that Bitcoin can have a big impact on the global economy in the future. I believe that it will lead to discussion at a very high political level in regards to if it should exist or not. I do however not believe they will be able to forbid Bitcoin from existing, i don't believe everyone even wants that to happen. I also believe that governments and companies in the future will buy Bitcoins and other crypto currencies as foreign exchange reserves. Some companies have already started to do so in order to get a diversified portfolio. This could potentially impact the global economy. We also have the energy side where the energy needed to run the network could impact the economy in one way or another.

**Q 14: There's some serious debasement happening and there's a lot of printing taking place. Why is sound money important from that particular point of view and do you think printing more money is good for the economy and inflation?**

I believe it is hard to define the word "importance". Printing money has in many examples been a solution to different economic problems in countries. It can however become a problem if you print too much money it can cause negative effects. The balance between the two is of course important.

**Q 15: What problem do you think Bitcoin could be intended to solve for the economy?**

I think that Bitcoin originated during a financial crisis where you were affected by central banks, you then wanted to find a way around that. You also wanted to be anonymous. I also believe, as I said, that Bitcoin can be intended to solve problems around inflation. I also believe that Bitcoin could function similarly to Swish where Bitcoin can function similarly in countries that do not really have the same infrastructure as Sweden.

**Risk & Limitations:**

**Q 16: Do you see any risks with a decentralized currency like Bitcoin?**

I have talked about this before but it is the fluctuation in value, that criminals use Bitcoin and the risks in regards to how the currency will be taxed.

**Followup question: What problems in regards to taxation are you thinking of?**

It is hard to handle for example currency gains in Bitcoins due to the fluctuation but as well as the anonymity where your part that you traded with is anonymous. The system then has to

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trust this and this could potentially be risky since it could be easily manipulated. It could also be difficult to handle it since the ability to move money all around the world is so great.

**Q 17: What do you think are the main risks and limitations your company is facing when adopting Bitcoin as a new currency?**

I think it is the value of Bitcoin. We are used to a stable currency of SEK, NOK and EURO. We therefore need a more stable currency or the ability to guarantee the value of Bitcoin.

**Q 18: How would you reduce risk exposure when using cryptocurrency? How would you apply risk mitigation?**

I would say that guaranteeing the value is one thing but i do not feel comfortable enough to answer this question fully.

**Q 19: Thoughts on the governments' ability to shut down Bitcoin?**

This is of course negative for the reputation of crypto currencies. I do believe however that it would be very difficult to shut it down entirely. I think it is very hard to forbid someone from using Bitcoins for example when the currency is so global. I think this will make it very difficult for governments to shut it down.

**Q 20: How is Bitcoin not going to be hacked like everything else? Or how is a hacker not going to bring down the network?**

There is of course a risk that this could happen. But there is also a risk that i get robbed at my current bank or on the streets. There is however some insurance if this could happen. The system with insurance is however hard to implement on Bitcoin since I do not know where one would turn if you get hacked or robbed of your Bitcoins. I do also find it difficult for the whole system to be hacked.

**Closing Questions:**

Q 21: Do you have any further questions regarding the interview?

No.

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### Interview D

Interview with the consulting company representative. Interviewed by Filiph Jönzén over Zoom on the 21 of may 2021 at 11:00. Language: English. Length: 39 minutes.

### **Introduction questions**

#### **Tell me a little bit about yourself...**

##### **Q.1: What is your position in the company you work for?**

I am an audit partner at the company.

##### **Q 2: What is your area of responsibility?**

As an audit partner, you are one of the owners of the firm. I am responsible for the development of the firm, to secure business as well as to secure that we have the relevant employees. I also have an overall responsibility for the engagements that I am a part of. This means for example that we fulfil the audit requirements as well as securing that the client is fulfilling different financial reporting regulations.

##### **Q 3: How long have you been working in the company?**

I have been working here for 25 years.

##### **Q 4: Have you only worked within this field during your time at the company?**

Yes, but not within the same area. I have always worked as an auditor but within different areas.

##### **Q 5: Do you have any previous experiences related to the topic?**

No, i started my career at my current company.

##### **Q 6: Do you have any academic background related to this field?**

I have a bachelor in business administration from Uppsala University. I was specified in accounting & finance.

##### **Q 7: Is there anything you would like to add?**

No.

#### **Tell me a little bit about the company...**

##### **Q 8: What is your company's business activity and where is it operating?**

The company is one of the big four, so we are a big international company. We are represented in almost all major countries in the world. There are three business areas, which are tax, audit and advisory. The audit is the basis of this where most of our clients are. The Swedish company also owns other subsidiaries in other countries in the baltics.

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**Q.9: How many employees does your company have?**

We have around 1 800 employees in Sweden.

**Q 10: What was the past year's turnover of your company?**

I think it is on average between 10-15%.

**Q 11: What are the core operations of your business?**

The core is auditing. But within auditing we have for example financial or corporate auditing. We also have departments like forensic or sustainability auditing.

**Q 12: Is there anything else you would like to add in regards to your company?**

No.

### **Transition Questions**

**Q 13: Are you comfortable so we can start the interview?**

Yes.

**Q 14: In the last 12 months have you been involved in any type of cryptocurrency processes? And If so, could you please elaborate in what kind of cryptocurrency you were interested in?**

I have not been involved with anything like that. I am however involved as an auditor in a company that works with blockchain technology.

### **Main Questions**

#### **Currency:**

**Q.1: How would you define currency and would you define bitcoin as a currency?**

That is a good question. I define currency as normal cash and you exchange business transactions with cash, which i know you can do with Bitcoin and other commodities as well. But my own experience is related more towards cash and other commodities like gold. For me currency is more linked to ordinary cash.

**Followup question: Could you see Bitcoin as a currency?**

I can, I have followed the development for some time which looks promising. I am a little sceptical however. To get it even more successful you need to increase people's awareness about it and also make sure that people can feel secure using it by securing transactions. I do like blockchain technology more since it is built around the purpose of traceable transactions.

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**Q.2: What is money in your opinion?**

I think that it is kind of the same answer as the previous questions. It is more linked to traditional cash. But of course, you can also do barter transactions for example. Instead of getting cash, you can get paid in some other way. For example paid in another service. You can also transfer money without getting anything back. One example could be a gift to charity.

**Q 3: What is the main difference between traditional currency and bitcoin?**

Yes, I mean there are. Bitcoins are more digital where traditional currencies are physical. I know however that there is a good way of transferring money when it is not digital. It might be an alternative good solution to traditional physical currency when we are matured enough. I think it is about trust and secureness. We must be convinced that it is secured. We also need to make sure how it is valued. You must feel that the financial infrastructure behind it is strong so that the value of what you own is not impaired.

**Q 4: What do you think are the costs of implementing bitcoin payments instead of paper money payments?**

There are already costs, you must also put an infrastructure in place in order to secure the system. There are most likely also costs associated with running the system.

**Q 5: What differentiates Bitcoin from other cryptocurrency and gold or paper money?**

Again, I mean gold has always been a safe haven if your own currency has problems with inflation. I therefore see gold as the most safe way of storing money for the future, even compared to cash. In regards to Bitcoin, I feel it's too early to be able to secure the future value.

**Bitcoin:**

**Q 6: What do you think are the advantages and disadvantages of bitcoin?**

The advantage is the relatively fast way of transactions between two parties as well as it could become more credible. If the transaction speed is faster this will likely reduce the costs of transaction fees. Another upside is the potential scalability. The disadvantages however are as i have mentioned before the difficulties in storing value and securing the trust in the system.

**Q 7: Would you in the current state of crypto currency be willing to lend, borrow or trade with Bitcoin? If not, do you see it as a possibility in the future?**

No, not yet.

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**Followup question: Why not?**

It is on the basis that I do not have the knowledge or experience of it. I think that i need to know more about it and i would therefore not do business with it if i'm not informed enough.

**Followup question: Do you feel it is too technical in general for people to understand it?**

I do believe people understand it, at least the big picture. I think the information is there, people will just need to learn how it works and the usability of Bitcoin will therefore eventually come.

**Q 8: What is the company you represent, position and views of bitcoin?**

I cant answer for the whole company, but here in Sweden we are following the development. If we for example work with a new client that works with Bitcoin, the company is considered as a high risk company. We then have to ensure the financial reporting and so on.

**Q 9: What is the future of Bitcoin in your regard and how can that affect your company?**

Yes, i think so. If it will be more trustable and people start using it, I think we as a company must also adapt and follow new norms and practises. That requires more of us in education as well as recruit new personnel with related experiences.

**Q 10: What are your misconceptions about Bitcoin?**

I think it is also about trust. Maybe that is a little bit exaggerated because I do not have all the information in regards to pros and cons. Right now i do not fully believe in it, i think i need more success stories.

**Q 11: Do you know the stock-to-flow model and if so what do you think about it?**

No, I do not.

**Inflation & Current economy**

**Q 11: How are you looking at inflation right now?**

I think it is still linked to the value of money. The value in itself is still linked to supply and demand as well as the political situation. It could also be linked to how developed the country is.

**Q 12: Thoughts on inflation & Bitcoin payment opportunities?**

I think that Bitcoin has a place to fill. I can not see any bigger difference compared to regular money. It is rather about the value, the value is not in Bitcoin. It is in products and services and the agreement between two parties. The value is of course then reflected into Bitcoin.

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**Q 13: What do you think is the impact of Bitcoin on the global economy?**

I haven't seen any major impact of Bitcoin on the global economy. But I can see it having an impact in the future. The more accepted it is, the bigger the impact will be on the global economy. That is how I see it.

**Q 14: There's some serious debasement happening and there's a lot of printing taking place. Why is sound money important from that particular point of view and do you think printing more money is good for the economy and inflation?**

This question was skipped because it has been covered in other answers as well as time constraints.

**Q 15: What problem do you think Bitcoin could be intended to solve for the economy?**

As it gets more secure and trusted, of course it can be a new alternative to money. It could become more efficient and potentially reduce transaction costs.

**Risk & Limitations:**

**Q 16: Do you see any risks with a decentralized currency like Bitcoin?**

The lack of trust basically. As the trust increases the risk will probably go down.

**Followup question: What do you exactly mean by trust?**

Both trust in the whole system but also trust in Bitcoin itself as an acceptable means of payment. You can also see that in currencies today where some currencies like USD or Euros are more trusted are also more useful. I think the big trust could be found in the widespread use of the specific currencies.

**Q 17: What do you think are the main risks and limitations your company is facing when adopting Bitcoin as a new currency?**

I think, as I said before, that we need to monitor the progress of Bitcoin. If we want to be involved we also need to understand security means, confidentiality etc. If we believe that we have that knowledge and that there is a trust, I believe that we can work with clients and exchange services for Bitcoins.

**Q 18: How would you reduce risk exposure when using cryptocurrency? How would you apply risk mitigation?**

Overall I think it's about customs. People need to be convinced to use it.

**Q 19: Thoughts on the governments' ability to shut down Bitcoin?**

I believe that they have the ability to limit the use of Bitcoins. I think that if authorities do not

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believe that Bitcoins are not secure enough, I believe that institutions could implement rules that limit the ability to perform transactions with Bitcoin.

**Q 20: How is Bitcoin not going to be hacked like everything else? Or how is a hacker not going to bring down the network?**

Yes, definitely. I see it as a big problem since that counteracts the whole thing. Since the risk of hacking is so high, hackers can affect the whole value of a Bitcoin.

**Closing Questions:**

**Q 21: Do you have any further questions regarding the interview?**

No, thank you.