Why Bitcoin Is Digital Gold And Ether Is The Currency of The Future

Summary

- Bitcoin is becoming established as a pristine monetary asset.
- Ethereum’s protocol is much more complex and flexible than Bitcoin. However, ether is Ethereum's native monetary asset and it has arguably superior monetary properties when compared to bitcoin, gold and fiat money.
- Ether is much more similar to money than it is to oil. However, it is a multifaceted asset that can be valued as:
    - Monetized Commodity
    - Currency
    - Bond
    - Growth Tech Stock
    - Consumable Resource
- ETH will become more scarce than BTC. ETH's net issuance rate is projected to become near 0% as soon as the fourth quarter of 2021, but not later than the end of 2022. This will be primarily possible due to the switch to PoS and transaction fee burning from EIP-1559.
- Ethereum's network "utility" is hosting its own digital economy, and it is using ether as its primary monetary asset. This means that ether's value is not restricted by supply side scarcity. It is also driven by its demand as collateral and a medium of exchange (DeFi, ICOs and NFTs). Transaction fees are also becoming an important contributor to ETH's demand (Ethereum's daily fee revenue is about five times as much as BTC's).
- An argument can be made that demand side impact for money as a facilitator of economic activity is even more important than its properties related to wealth preservation. This theory would explain why the global money supply (the total amount of fiat money in the world) is worth about ten times more than gold's market capitalization (the market price of all the gold in the world). This will contribute to ether’s valuation when compared to bitcoin.
- Ethereum's combination of persistence, permanence, utility and scalability will cement it as the #1 monetary network. Ethereum Killers will likely become Layer 2+ (sidechains) scaling solutions to Ethereum. They will be much more scalable than Ethereum, but permanence is more important than utility when it comes to monetary networks and value retention. These networks can prosper, but they must be valued primarily on a cash flow basis as cloud service providers as opposed to monetary assets.
- Multiple unprecedented macro factors are lined up and creating a massive appeal for cryptocurrencies. This will continue to drive institutional and retail demand for Bitcoin and

Ethereum. At the bare minimum, Bitcoin and Ethereum should be considered an important hedge against other asset classes and the prospect of inflation.

Introduction

In 2020, Bitcoin and cryptocurrencies reentered the media spotlight as a new crypto bull cycle began. In the same year, Bitcoin surpassed its previous all time high of $20,000 and reached almost $30,000. Public interest in Bitcoin as a better alternative to gold also increased due to central banks' engagement in unprecedented expansionary monetary policies. Bitcoin is establishing itself as a pristine monetary asset due to its artificial scarcity that limits the maximum number of bitcoins to 21 million. In the wake of its success, countless new cryptocurrencies emerged as possible contenders. Amongst them, Ethereum: a transformative cryptocurrency that continues to evolve into what many investors in the space believe will become the dominant monetary asset in the world. This belief is founded on technical enhancements that will potentially turn ether into a deflationary asset while at the same time being uniquely positioned to facilitate economic activity as the most frictionless form of money in existence.

Ethereum investors tend to understand that network upgrades currently being implemented will result in a sustainable monetary policy with near 0% issuance and the potential for ether to become a deflationary asset. What is even more interesting is that the net return of ether as a SoV (store of value) becomes superior to bitcoin the moment that issuance is lower than the staking yield (a form of passive income that will be provided to ether long term holders). In other words, even if Bitcoin had already ceased issuance, it offers no mechanism to provide yield to long term holders with a negligible risk exposure as Ethereum does.

There is an execution risk that Ethereum will not deliver on what is currently planned, but if it does, then it will become more scarce than Bitcoin could ever become under its cryptoeconomic model. However, the focus on scarcity as the primary contributor of value to a monetary asset is arguably misplaced. A dissection of the intrinsic value of money and how it is used can reveal a different story where value is primarily derived from the facilitation of economic activity rather than scarcity. In this regard, Ethereum has a tremendous advantage over Bitcoin because what is often described as “Ethereum’s utility” is actually the economic activity occurring in its digital domain.

Bitcoin seems fast and frictionless, but that is only because it is being compared to something in the physical world. In digital terms Bitcoin emulates the friction of operation that is found with gold: it is difficult and expensive to move it, securing it yourself is not trivial, and it does not make for a great medium of exchange. This is not an ideal dynamic for a system which will ultimately rely solely on transaction fees, and it raises concerns about the long term sustainability of the system. This may be a subjective interpretation of it, but regarding this particular situation it is nearly impossible to make objective assertions at this point. It is possible to assert that, in the digital world, the expectation of frictionless money would entail near instant transactions without the risk of irreversibly losing funds due to simple mistakes.

Cryptocurrencies do not offer any mechanism to recover lost funds in case an account gets compromised by a hacker or a mistake is made during a transaction (like keying in the wrong recipient address); this is a serious problem. It is the reason why dealing with cryptocurrencies directly involves a level of risk/paranoia similar to dealing with nuclear waste and having a hacker watching your every move waiting for you to make a mistake to snatch it away. Digital money would also need to be fully programmable and interact with other digital assets, preferably defined and operated within the same ecosystem. Ethereum is steaming ahead on all fronts.

Unlike Bitcoin, Ethereum is a fully programmable protocol that is capable of fostering a digital economy (this is a very important part of understanding the value of ether) in addition to hosting its own native monetary asset called ether. A set of financial applications running on Ethereum are creating a form of decentralized financial system (DeFi) that is dramatically more efficient, reliable, and inclusive when compared to our traditional financial system. DeFi is one of the reasons Ethereum is currently (as of 8-13-2021) generating about thirty-four times as much transaction fee revenue as Bitcoin, but it is just one of the almost infinite applications that can be provided by the Ethereum network.

In addition, multiple scaling technologies called “Layer 2 solutions” will greatly increase Ethereum’s transaction capacity. These are going live as we speak, and it appears they will be much more practical and provide better user experience when compared to Bitcoin’s scaling solution which is called the Lightning Network. This will help to amplify Layer 1 block space value and push transaction fee revenue even higher. That will be followed by EIP-1559, which is an enhancement designed to stabilize fees, improve security related to edge cases, and create a deflationary mechanism through the partial destruction of transaction fees. Eventually the transition to Proof of Stake (PoS) will dramatically cut the operational cost of the network. That means that Ethereum as a business will become more profitable and less reliant on the issuance subsidy. Finally, we will see the introduction of sharding which will scale Layer 1 by up to 1,000 times, compounding the effect of Layer 2 solutions and making it feasible for the network to operate as a platform for new use cases. A solution to the hacker/nuclear waste security situation is being explored via social recovery wallets. Social recovery wallets leverage Ethereum’s programmable capabilities to create a dynamic that is a mixture of self-secured “be your own bank” cryptocurrencies with the protection advantages offered by the traditional banking system. It is still in the early stages of research and design, but it is important to realize that the Ethereum community recognizes it as a problem and is working on a solution.

The combination of Ethereum’s monetary policy, its programmable capabilities, and its scaling roadmap will pave the way for ether to become a more valuable asset than bitcoin and gold because it will be more scarce, significantly more useful, and provides passive income to long term holders.

Ethereum is a once in a lifetime investment opportunity, but it is also much more than that. It is an awe inspiring technology and a tool that promotes democracy and the betterment of mankind. At its core, Ethereum is about leveling the playing field. It is about breaking chains and

removing gatekeepers. It is an unstoppable force because it is not just driven by individual financial gains. It is driven by the passionate desire to be part of something much bigger than ourselves; something that can truly make the world a better place. It is real, and once you see how Ethereum can achieve this, you too will become passionate about it. In the end, Ethereum will not lead us to utopia, but it will save us from dystopia, and it will make the pursuit of happiness much more attainable.

A Personal Perspective About Bitcoin and Ethereum's Potential as Currencies

The most controversial narrative about decentralized cryptocurrencies is that they will eventually replace fiat money as the world's primary form of currency. In order to explore the merits of this claim, I feel that it would be helpful to give you a little background of who I am and why I started to invest and eventually write about crypto. My name is Adriano, I am 37 years old, born in Brazil and moved to the US when I was 17. I have had the "privilege" of living in a country that struggled with monetary policy for many years.

During my years in Brazil, I witnessed a total of five different currencies die before the Brazilian Real came along. The lifecycle of currencies was so short that at one point the government just started stamping old bills with the new currency name and denomination (this actually happened a couple of times). It is hard to believe how a country's monetary policy could be such a joke, so I have included a couple of pictures for its comedic value (I remember using both of them).

Inflation peaked in the early 1990's at around 7,000%. At this rate, a big mac would cost $280 after a year has passed, and almost $20,000 after two years. That was a horrible circumstance to live in, especially considering that minimum wages were way below what is considered poverty levels in the USA. If you thought that this wasn't bad enough, then just wait to hear how it got a LOT worse. In 1990 our "good guy" right-wing president (this is an accurate representation of the opinion my family and our social circles held about him) came up with a wonderful "plan" to tackle inflation: he decided to freeze bank accounts during peak inflation. I don't remember the details of how it went down, but you can read a brief description of it here. Our wonderful president had severely restricted outflows from bank accounts for long enough that the money had lost most of its value by the time the restrictions were lifted. Life savings were destroyed and some people even committed suicide. I think it goes without saying that if

Bitcoin and Ethereum had been around during those times, then it would have been preferred over a new state issued currency (or at least the state would not have a monetary monopoly).

This monetary/financial destruction pattern is not unique to Brazil. Fiat currencies go through this cycle on average every 27 years. It has also happened in Hungary, Yugoslavia, Germany, Argentina, Greece, Zimbabwe, Venezuela, Lebanon and many more countries during the past century. A financial crisis does not need to be a monetary crisis; banking systems can fail on their own and inflict almost as much damage to personal wealth and economic productivity. The list of countries with a history of banking failures is also extensive: Sweden, Finland, Russia, Uruguay, Turkey and Ukraine are just a few examples. The USA came pretty close to making into the list in 2008.

Those who are unfortunate enough to have lived through a monetary or financial system collapse understand that the idea of Bitcoin and Ethereum overtaking fiat is not a fantasy, and there is a strong point to be made about this. There is evidence to support the theory that a global shakeup of monetary and financial systems is approaching a point of no return. No one can say for sure that it will happen, but no one can say that it won't.

If we can establish there is a real risk that things could get really ugly (at least in some countries), and that the consequences would be dire, then it becomes much easier to see how Bitcoin and Ethereum can function as a hedge against the traditional banking and monetary systems. Collapses are real, they happen all the time, and there is plenty of data to suggest global systems are deteriorating at a rapid pace with no tangible solution in sight. This deserves to be taken seriously and discussed with the appropriate historical and geopolitical context.

Traditional Monetary Systems

The cryptocurrency mania is rooted in the understanding of something most people do not yet understand. There is a political dynamic about our modern monetary system that results in a 100% failure rate. We have all been conditioned to ignore the very nature of our modern monetary system. It is a failed and fundamentally flawed system. Proving this is trivial: the $USD is the best fiat currency in history, but it has lost over 96% of its value over the past 100 years. The *best* asset in its class has lost virtually all its value in the course of a lifetime. This is absurd, but a bigger absurdity is the fact that so many educated and intellectually capable people are so defensive about it. Let it be clear: decentralized cryptocurrencies are categorically superior monetary systems when compared to fiat.

Every fiat system is destined to fail because of political influence over money supply and discretion regarding the distribution and allocation of newly created money. There are three fundamental problems with it:

1. Incompetence
2. Conflicts of interest
3. Desperation, which is often a result of the prior two

A clear example of incompetence is the notion that pegging an alternative currency to the USD is a sustainable policy. It always fails for reasons that are obvious to any reputable economist. Pegging a domestic currency to another is a recipe for disaster, especially when the local economy is heavily dependent on international trade. This was exactly the case of Lebanon's currency, and one of the reasons why it collapsed.

Conflict of interest comes in many forms. First of all it is very attractive for politicians to either cut taxes or increase benefits without enduring any palpable negative consequences during their administrations. That is achieved by issuing more debt, and central banks are facilitators and enablers of monetary debasement. It would be politically undesirable to attempt to reverse this trend, so it is bound to get worse over time.

Another destructive outcome from political influence is financial self interest (the modern elite friends and family club). If the government has the ability to create infinite amounts of debt, it has the ability to distribute infinite amounts of money whichever way it pleases, and politicians get to pick who gets how much money and when they get it. This dynamic is legalized through lobbying, super PACs, the ability for politicians to award contracts to the same corporations that they own equities, and the political “revolving door”. The people are always demonstrably on the bottom of this list, and they have to settle for crumbs.

When you combine incompetence, conflicts of interest and a black swan event such as a global pandemic, then you end up the perfect storm for a monetary collapse. History has shown us that this is exactly what happens to *every* centralized monetary system.

Comparing traditional monetary policies from central banks to cryptocurrencies like Bitcoin and Ethereum is does not make much sense because these cryptocurrencies have zero discretion about how newly minted coins are distributed, and the purpose of issuance is exclusively to subsidize security, rather than impact aspects of the Ethereum economy. Conversely, the purpose of traditional central banking monetary policy is described as such: "Monetary policy in the United States comprises the Federal Reserve's actions and communications to promote maximum employment, stable prices, and moderate long-term interest rates--the economic goals the Congress has instructed the Federal Reserve to pursue."

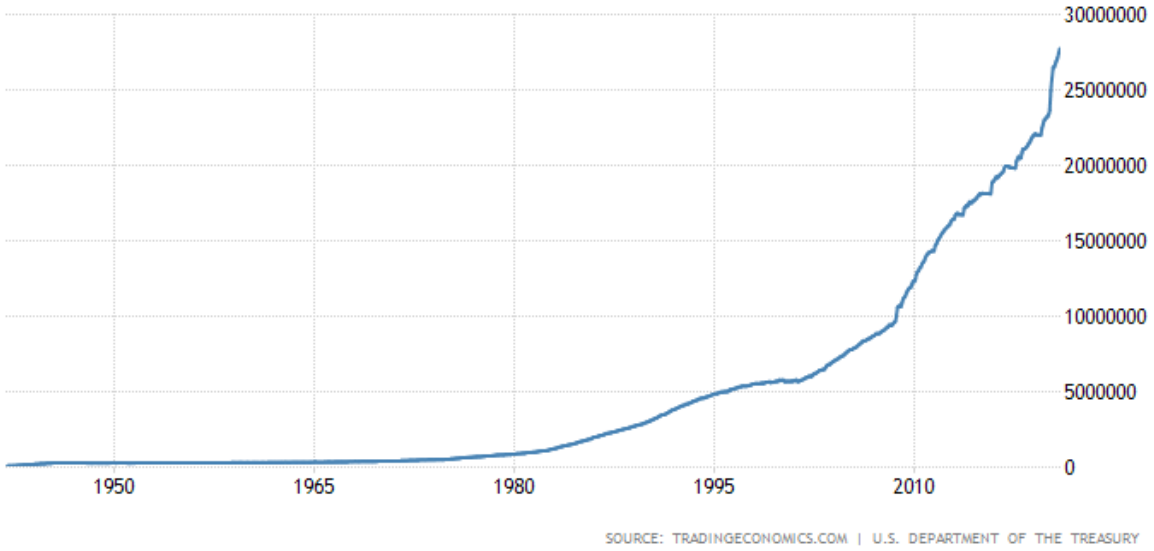
Our mindset must change from “we don’t need a new monetary system” or “nothing can compete with government issued fiat money” to “what would it take for something to compete with it; what could be better?”

Decentralized cryptocurrencies are the answer. It’s about time to learn what these systems are, how they work, and what makes them valuable. The best way to start is by learning about our current failed system, and from there move on to Bitcoin and Ethereum.

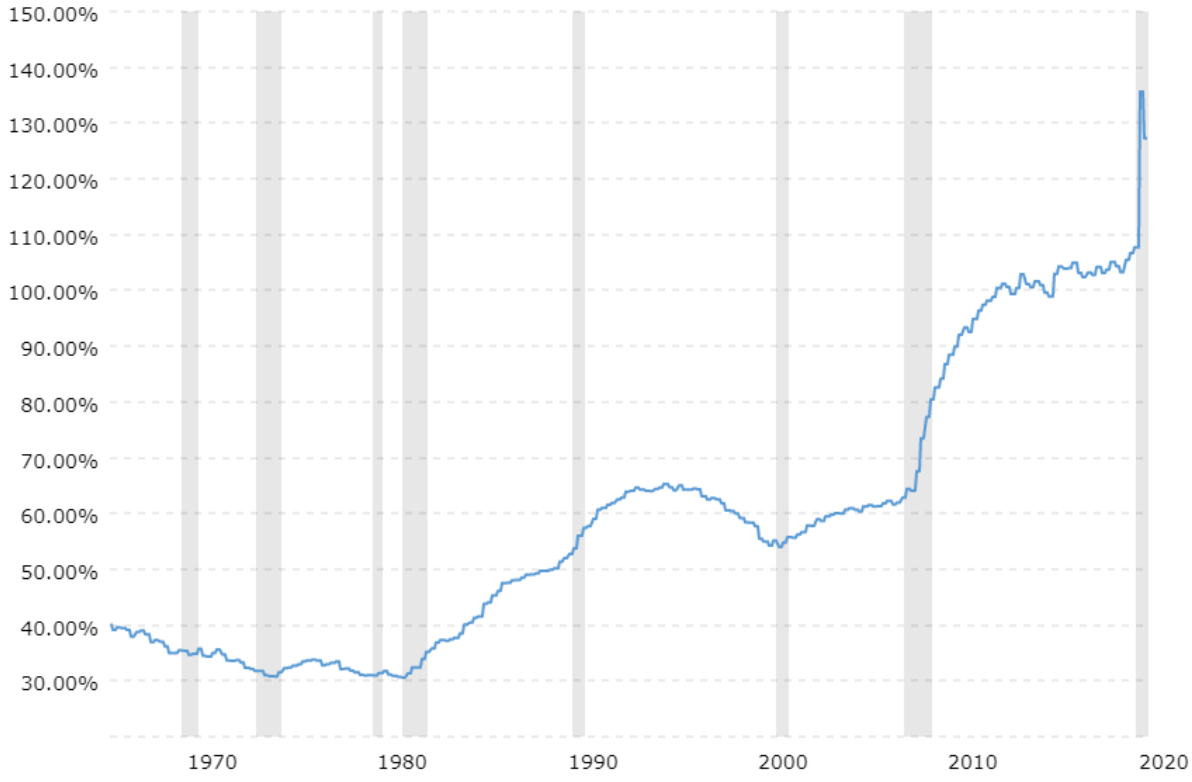
Global Macroeconomic Backdrop

- The average lifespan of a FIAT currency is only 27 years. Monetary collapses are critical catalysts that will help cryptos to gain mass adoption and evolve into mature currencies. Crypto is the better choice anytime inflation becomes worse than volatility. In the absence of crypto, people were left with no choice, but they will soon start rejecting new versions of the old same thing. As monetary policies fail, Bitcoin and Ethereum will benefit from an increase in adoption. It is monetary natural selection at work, and it has never been more relevant.
- Reserve currencies like the American dollar and the Euro are not likely to collapse, but low interest rates will continue to be pushed by central banks, driving the relative price of bonds, equities and real estate even higher. At the bare minimum, this situation will make investors feel uneasy with the sustainability of asset valuations and the possibility of higher inflation rates. This will encourage them to look for hedging alternatives (ie: cryptocurrencies).
- The IMF is setting the stage for drastic changes on a global scale by announcing that it is time for a Bretton Woods 2.0. The significance of this announcement cannot be understated.
- Unlike the original Bretton Woods Agreement, today the global monetary systems are operating without any hard assets to back them up. World currencies are backed by the American dollar, but the dollar is backed by nothing (even the petrodollar is losing ground). The global monetary system is walking on a tightrope without any kind of safety net.
- $18 trillion in negative yielding debt has been accumulated globally. This is the single strongest indicator that markets are broken and that capital is having a very hard time being efficiently allocated. Excessive monetary expansion and poor distribution of wealth have created an “everything bubble” and crypto is well positioned to pop it.
- Politicians and central banks have been kicking the can down the road for so long that it has now become a steel barrel, and soon enough no amount of kicking will be able to make it budge. Monetary policy has admittedly become less effective over time, but world leaders continue to use it as the primary mechanism to fix economic and financial issues that are deeply embedded in traditional systems.
- Every government that is in debt is motivated to misrepresent official inflation numbers to appear lower than reality. This allows governments to debase the currency and consequently their debt. It does not mean that governments are willingly distorting numbers, but there is evidence suggesting that real inflation is higher than what official numbers are reporting.

United States Government Debt 1942-2020:

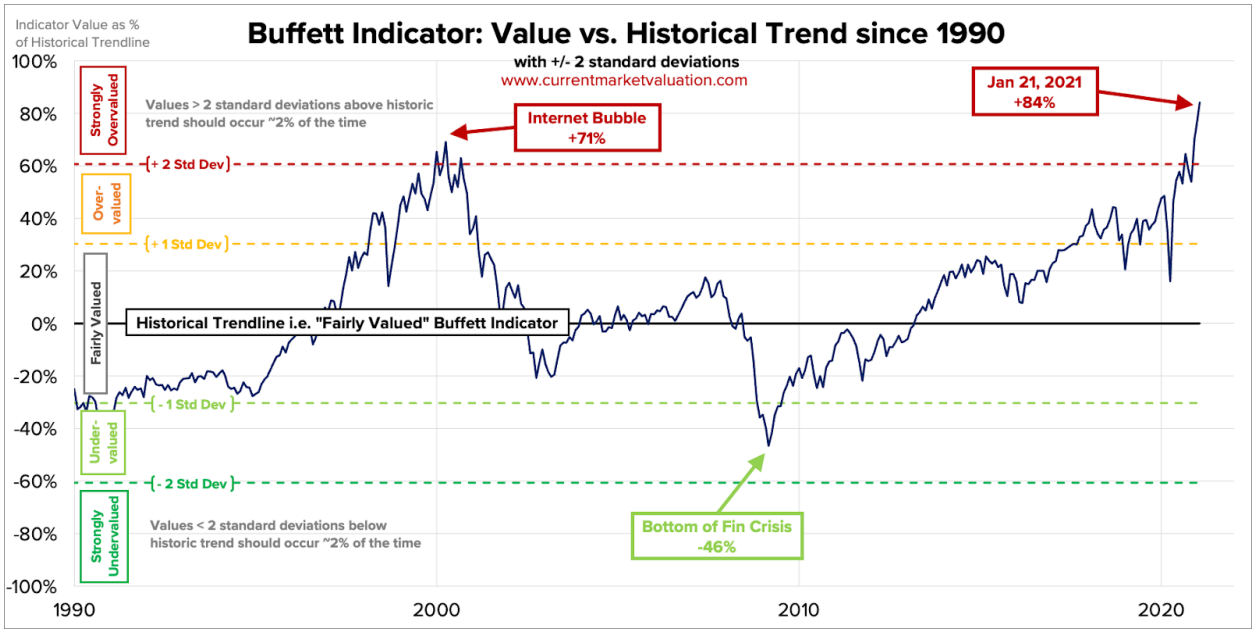


United States Government Debt to GDP Ratio:

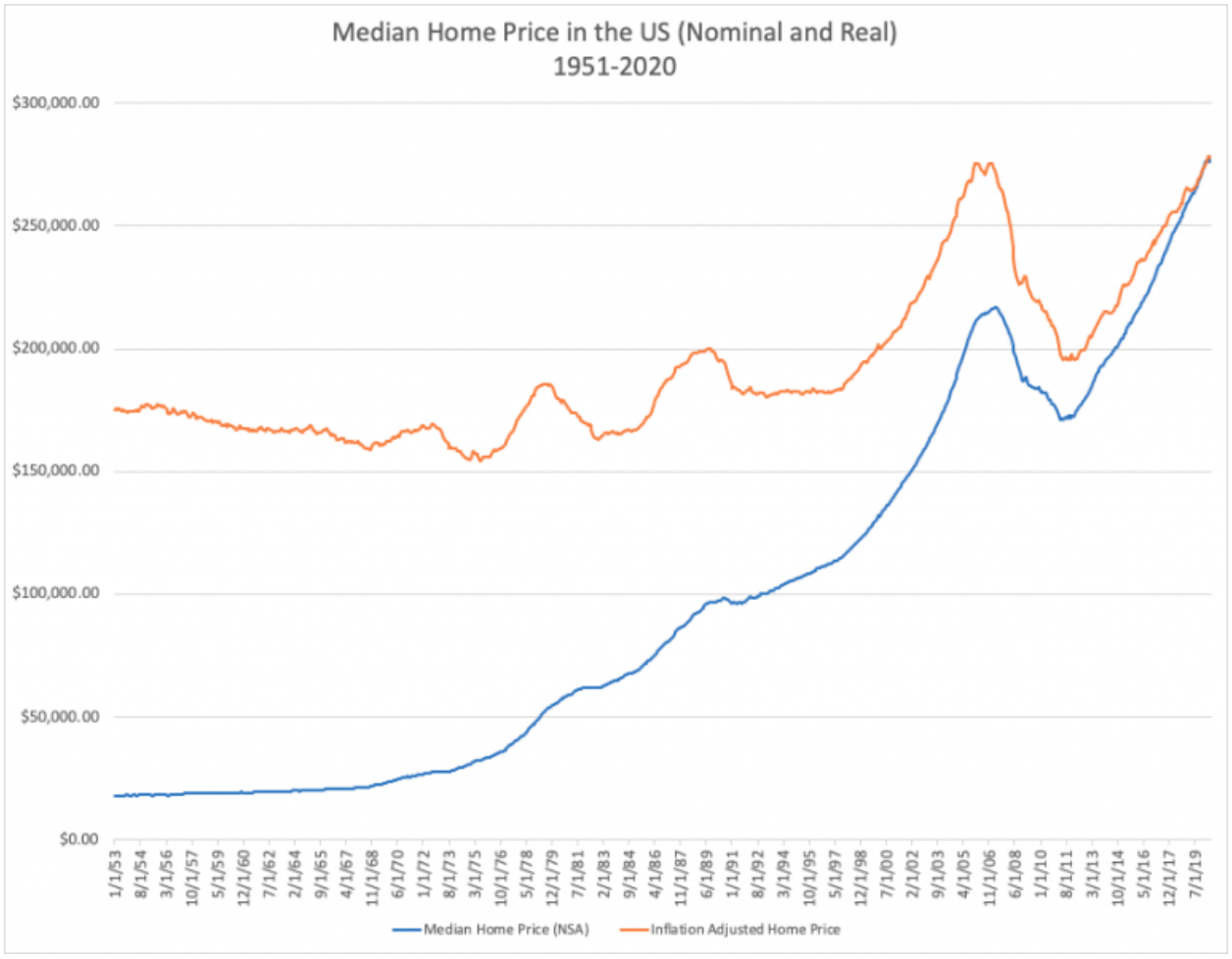


10 Year Treasury Rate - 54 Year Historical Chart:

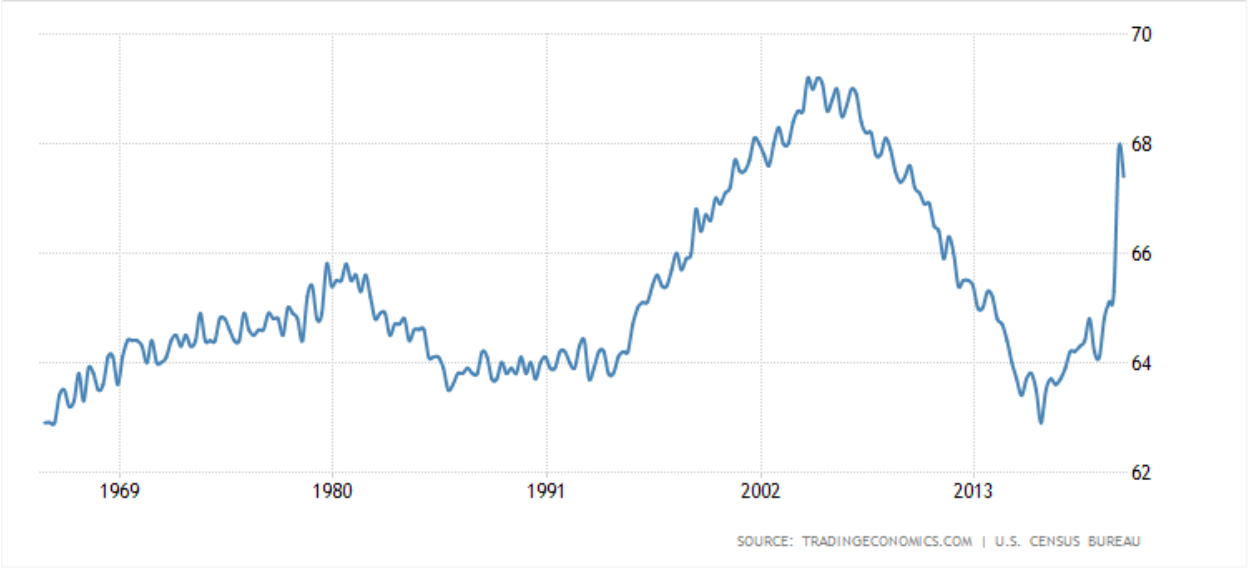
Buffet Indicator:

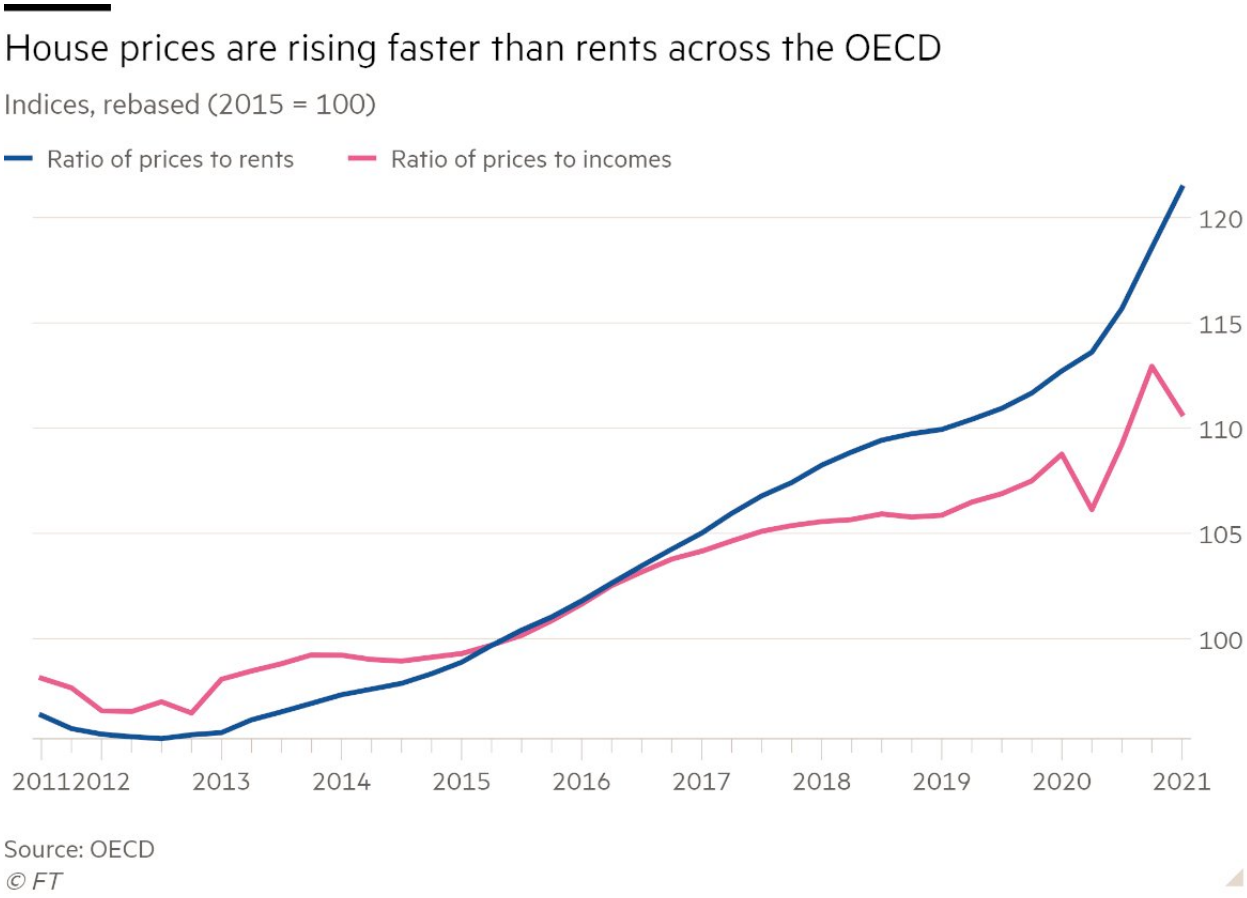


Median Home Price in the US (Nominal and Real) 1951-2020:



United States Homeownership Rate 1965-2020:





<TODO: talk about [Ray Dalio's simplified economic model based on debt cycles](). >

<TODO: explore how cryptos are our best hope to fix issues that are deeply embedded on the traditional financial, political and monetary systems. Possibly mention quadratic voting/gitcoin grants.>

<TODO: explore how equities are in unprecedented bubble territory (buffet indicator), how bonds are also in unprecedented bubble territory (low yields = high prices), how real estate is also in unprecedented bubble territory (all-time high inflation adjusted median prices) and that the intrinsic value of property can be observed via rental prices because it is what people are willing to pay to live in the property (and how it is not keeping up with property prices) -> this is an indication that real estate, just like the equities market, its disconnection from fundamentals can be interpreted as an increased level of monetary premium. We have reached such absurd levels of valuation, you would imagine that we are in a period of unprecedented growth, stability and economic optimism, but the opposite is true.>

<TODO: explain how a long period of extremely low interest rates have pushed investors to seek returns in assets that have a progressively higher risk/return ratios. As each level of risk/return becomes saturated, investors are pushed to higher levels of risk. Not only that, the extremely low interest rates have also resulted in an increased overall leverage in the system. Individuals and institutions have become comfortable with taking higher risks because they know central banks will come to the rescue when things go sour. This has created an extremely toxic environment for financial markets>

<TODO: explain how Ethereum's payment rail and tokenized dollars will offer a safe haven for people living in a country with an ongoing monetary/banking crisis.>

<TODO: it is possible to short the system (the combination of traditional asset markets and monetary systems) by longing crypto assets. This is a much safer alternative to shorting directly via traditional routes because it is not exposed to risks associated with an extension of the bubble (implied volatility premium decay) cycle and/or short squeezes.>

<TODO: explore how inflation can be simulated with fiscal policy via a mixture of tax-credits/taxation based on money aging and income brackets. This is only possible with a monetary system that operates exclusively in digital form.>

<TODO: talk about how Michael Burry was too early on his bet against the real estate bubble. How it almost bankrupted his investment company, and how that bubble cycle was actually much shorter then the long monetary cycle we are in. Macro "permabears" may be correct in pointing out the weaknesses of the system, but market irrationality may be sustainable for an extended period of time)>

Monetary and Reserve Assets

This segment is challenging conventional economic theory and introducing new theories in the process. It is highly controversial and it needs to be taken with a grain of salt. With that said, the ideas presented here are explored through critical thinking with succinct explanations for each concept. Below is a list of key concepts and terminology that are being challenged and/or elaborated in a way that diverges from its original definition:

Intrinsic value of money: Money does have intrinsic value (monetary utility). It is undesirable for money to have any form of alternative intrinsic value, e.g., gold's industrial intrinsic value. Under normal circumstances, scarcity is not the main contributor to money's intrinsic value.
Asset monetization: this normally means converting something into money by selling it. This segment uses this term to explain the process in which an asset develops properties of money and consequentially gains the classification of a reserve asset.
Monetary premium: this term has been used loosely before, but this segment uses it to define the portion of an asset's value that can be attributed to its use as a reserve/monetary asset.
Reserve asset: the idea that this classification is defined by a sustained high level of asset monetization that causes a change in its market valuation psychology, and that fully monetized assets are called monetary assets. The best example of this is gold: at some point in the past gold was just a natural resource and it evolved into a fully monetized asset, and then devolved into a partially monetized asset with an alternate industrial utility.
Store of value: store of value has been broken down into two distinct functions by contextualizing a time span. Short and long terms provide value in different categories of money's intrinsic value. Short term SoV is providing for economic activity facilitation while long term is providing for preservation of wealth.

The topic of money is central to cryptocurrencies. The definition of money has been discussed, analyzed and dissected ad-nauseam by almost every major crypto influencer in this space. Andreas Antonopoulos has done a wonderful job covering this subject from historical, economic and political perspectives. However, I was left with a feeling that there was something big missing, but I just could not explain what it was. There are a couple of narratives surrounding money and Bitcoin that don't add up, and conventional economic theory doesn't fully explain the nature of money. This is what was bothering me the most:

1. Bitcoin's narrative suggests that scarcity is the most valuable property of monetary assets because it is what defines it as "sound money".
2. Warren Buffet's accusation that Bitcoin is worthless because it has no intrinsic value, and it is not a productive asset.
3. The fact that the global money supply is worth about 10 times gold's market capitalization despite the latter being more scarce.
4. The lack of consensus explaining why multiple asset classes are so overvalued and disconnected from fundamentals. The lack of consensus regarding the sustainability of this situation and how it can be eventually undone.

There is a reasonable explanation that debunks these narratives while also providing an answer to why fiat money is more valuable than gold. It starts with analyzing the meaningfulness of the functions of money. The most concise break down of the functions of money splits it into three categories:

1. Store of Value
2. Medium of Exchange
3. Unit of Account

If you are not familiar with these, you can read more about it here. Traditional economic theory states that money does not have intrinsic value. Many people intuitively disagree with this premise, but there is no official rebuttal to it. We can attempt to derive the intrinsic value of money by analyzing its core functions.

Money's functionality as a medium of exchange and unit of account can be condensed into a single function: economic activity facilitator. It is the combination of money's properties as a medium of exchange and as a unit of account that defines its utility as a facilitator of activities that generate economic output. Another way to say this is that money reduces the friction that is caused by the need to communicate and exchange value during economic activity. The easiest way to demonstrate this is by conceptualizing what would happen to a country's economic output if it stopped using money overnight. It would be a chaotic situation that would cause a dramatic reduction of productivity. If you agree that an economy facilitated by money works more efficiently than a barter economy, then you will also agree that one of the core functions of money is to facilitate economic activity. Consider the revised list of functions of money:

1. Store of Value
2. Economic Activity Facilitator
    a. Medium of Exchange
    b. Unit of Account

This is starting to look better, but there is one more thing that needs to be re-evaluated. Store of value is not a monolithic function. It needs to be contextualized by time, and doing so generates polar ends representing short-term store of value and long-term store of value. These are not core functions of money, they are actually subsets of something else. Long-term store of value is a subset of its function as a preserver of purchasing power, while short-term store of value is a subset of the previously defined economic activity facilitator. These needed to be differentiated because businesses and people are not primarily dealing with money as an investment, but rather as an expendable resource that is in constant rotation through cash flow. With respect to SoV properties, the motivation to operate with cash is to prevent a sudden short-term loss, and fiat money is much more effective at this. I would also argue that, as a psychological motivator, the fear of a significant short-term loss is stronger than the certainty of a gradual long-term loss. However, there is a threshold to the amount of short-term loss that is acceptable. It is hard to quantify an exact number, but when a currency crosses this limit, it is at risk of collapsing.

Money's importance as a facilitator of economic activity is reinforced by how it is used as a common language to express and communicate value. If a goat farmer wants to purchase something from a vendor, then he needs to quantify the value of what is being offered as payment; it does not matter if goats are infinitely liquid unless both parties in the economic transaction fully understand what the value of a goat is to start with. Imagine having a business meeting to discuss the cost and pricing of goods without having a common denominator that can be used as a unit of account. These simple examples demonstrate how money's abstract utility as a language to express value has a tangible impact on productivity and therefore facilitates economic activity.

<TODO: demonstrate the value of money as a purchasing power preserver by contrasting it with the best alternative that is not money, include upkeep costs and possible decay>

With that in mind, here is the updated list of functions on money:

1. Preserver of purchasing power
    a. Long-term store of value
2. Economic activity facilitator
    a. Medium of Exchange
    b. Unit of Account
    c. Short-term store of value

Another way to look at this list would be to say that the two newly defined core functions are actually the intrinsic value of money. In a subtle way, these things are what is produced by the utilization of money. Ultimately, these are the two reasons money has intrinsic value ordered by level of importance:

1. Facilitation of economic activity
2. Preservation of purchasing power

We don't need to know exactly how the intrinsic value is calculated, we just need to know that it exists. With this understanding of money, it becomes easier to continue to explore answers for unexplained observations and debunk other misconceptions. Let's start with what is conventionally understood as gold's intrinsic value: its industrial use. The intrinsic value of gold as an industrial resource has nothing to do with its intrinsic value as a monetary asset. These have completely different uses with different demand curves competing for the same resource. This is not a good thing because a demand shock of its industrial use would result in a supply shock of its monetary use. This can be easily observed with a real case scenario of another resource that is partially monetized, but that holds a much higher level of non-monetary utility: black gold, aka oil. In 2020 the demand shock for oil as fuel resulted in a supply shock of oil as a monetized commodity, and the price inevitably collapsed. Oil has a relatively low monetization premium, but it is a good example of how alternative intrinsic values are not desirable for reserve/monetary assets.

The more “real world” value a monetary asset has, the more it is susceptible to be affected by its alternative demand. The only positive thing that can be said about alternative demand is that it would prevent the value of a monetary asset from going to zero. Gold is not a good store of value *because* it has a conventional intrinsic value. It is a good store of value *despite* it. The perfect monetary asset should be completely useless and devoid of any real world use other than to function as money. Warren Buffet’s argument that bitcoin is worthless because it has no intrinsic value is actually the reason it is a superior form of money (even better than paper money) - it combines some of the best properties of gold and fiat.

Fiat is vastly superior as an economic activity facilitator than gold, and the fact that it has no alternative intrinsic value strengthens its function as a short-term SoV. Money’s utility as an economic facilitator is much more valuable than its utility as a preserver of wealth. This is the reason why the global money supply is worth about 10 times more than gold. Bitcoin’s theory that it is so valuable simply because it is a hard asset is flawed. If L2 solutions, EIP-1559 and Ethereum 2.0 are executed properly, then ether will be even harder than bitcoin, and it will have the advantage of hosting its own virtual economy with a dramatically superior payment rail. These are not just nice things, these are requirements for frictionless money.

Inflation

When money supply increases faster than economic activity, then one of two things must happen: money velocity will fall or the value of money will fall (ie. inflation). The result is heavily dependent on consumer sentiment and distribution of wealth. If consumer sentiment is low, then people are naturally encouraged to save more money. If the newly printed money is allocated to the affluent, their spending habits will barely change. Money is a very effective economic activity facilitator, but its inflationary nature makes it a bad asset to preserve purchasing power in the long term. When money supply exceeds the demand for economic activity, then there is an incentive for it to be re-invested into different assets that have superior properties pertaining to wealth preservation. This increases the monetization of gold, and other contenders that share characteristics desirable for long term store of value. An increase in money supply that fails to increase consumer confidence and/or is not efficiently allocated generates inflation of other asset classes as they become increasingly monetized. Efficient allocation of money means that it must increase economic output as a result of the investment (ie. increase productivity).

The conclusion is that inflation can be manifested in two ways:

1. Goods and services inflation: the official methodology used to determine the indexed inflation rates (Consumer Price Index and Retail Price Index) is focused on the rising price of goods and services. These are the numbers reported by media outlets.
2. Asset inflation: manifested through the monetization of alternative asset classes (this is what is happening today in global equity, bonds and real estate markets). This type of inflation is not reflected in official indexes.

When you hear that the US dollar is not seeing any inflation, you must take into consideration that asset prices are completely disregarded, but this is where most of the newly printed money is ending up. This helps to explain why equities are completely disconnected from fundamentals, why bonds have near-zero or negative nominal yields, why even more bonds have negative real yields (when accounting for overall inflation), and why real estate prices keep going up (at a faster rate than rental prices) even though unemployment and economic uncertainty continue to creep up. The market sentiment towards mega corporations, and their story, has become more optimistic than gold despite record high valuations. The likelihood these companies will issue new stock is virtually non-existent. Apple, Google, Microsoft, Facebook and others are effectively competing with gold. This will change as the market learns about and gains confidence in Bitcoin and Ethereum. Why? Because bitcoin and ether were designed to be monetary assets that excel at performing as preservers of purchasing power; however, ether also excels as an economic activity facilitator.

Cryptocurrency Basics

Thinking that cryptocurrencies are a scam or baseless speculative assets is a perfectly normal response for most investors. This is how I initially reacted when I first heard of Bitcoin, and then again when I first heard of Ethereum. For the uninitiated, the idea of decentralized digital currencies indeed sounds like a scam because it is a radical departure from our current paradigm about money. It contradicts a worldview that assumes money must be issued by a central authority.

The thought of a privately issued currency is not something that has crossed the mind of most investors, therefore an even more exoctic concept of money such as decentralized currencies is virtually unimaginable. Cryptocurrencies are a multidisciplinary topic that is profoundly nuanced and difficult to understand. A holistic investment thesis requires expertise in multiple intellectual domains, including the following:

1. Expertise in computer science involving databases, networking, cryptography, virtualization and programming. Or *trust* in an expert who can comprehend and attest for the robustness of the technological properties of cryptos.
2. Elevated understanding of micro and macro economics. Or *trust* in an expert in this subject who can comprehend and attest for the robustness of the economic/monetary properties of cryptos.
3. Historical and contemporary knowledge of monetary economics, politics, and how both are related to cryptos.
4. Behavioral and social psychology (game theory).
5. For unfinished projects: understand the vision, legitimacy and competency of leadership/contributors, and the path to decentralization (if there is one).
6. Understand the vision of how society and governments will be transformed by technology (automation, AI, virtual reality and cryptos) in the next couple of decades.
7. Be able to digest the information of all these factors combined, and how these are reflected in the valuation methodologies of cryptocurrencies.

It is easier to discuss Ethereum if you already understand the value proposition of Bitcoin. Even though Bitcoin's "digital gold" value proposition is simplistic, understanding the intricacies that support such narrative is not. The difficulty starts with the fact that Bitcoin is not just a digital asset, it is also a payment system. It is like a new internet bank that has its own digital currency and operates exclusively with it. This digital bank is the Bitcoin network (with a capital B), and its currency is called bitcoin (with a lowercase b). Bitcoin's bank and currency are fused together into a set of operating rules that is formally called a protocol. The design of this protocol achieves three major accomplishments:

- It defines a digital asset with absolute scarcity.
- It operates as a digital bank and payment system that is permissionless, trustless, and censorship-resistant.
- It establishes virtual indestructibility (persistence and permanence) achieved by a mixture of cryptography and economic incentives that promote security based on

mathematical principles. This security system is strengthened by network effects and decentralization.

The combination of these factors is what makes Bitcoin unique and extremely valuable as a monetary asset. Let's look at individual aspects and how each contributes to the value proposition.

Scarce Digital Asset

Scarcity is one of the pillars of monetary value simply because it prevents the dilution of its base. If something is valuable, then people will try to get (or create) more of it by any lucrative means. Scarcity creates a supply ceiling that restricts the creation of more units of an asset, and therefore it prevents its debasement. Another way to look at it is to say that scarcity imposes restrictions on the supply of an asset. This is critically important since, in free markets, every asset is ultimately priced according to the law of supply and demand.

Bitcoin's protocol establishes a supply cap of 21 million bitcoins. This could be changed, but only if an overwhelming majority of all stakeholders and network participants agree to it (this is called network consensus). Bitcoin's ethos is centered on its artificial scarcity, so deviating from it would have an enormous negative impact on its value proposition. Naturally, any proposal to change the supply limit would be faced with severe opposition from stakeholders. There is no ruling authority that can make changes to Bitcoin's protocol; any modifications to the protocol require network consensus (including the supply cap). For this reason, Bitcoin's supply cap is assumed to be immutable. For the same reason, proponents of Bitcoin assert that it is more scarce than any monetary asset that preceded it (including gold).

Payment System

Anyone in the world with an internet connection can send and receive bitcoins without having to disclose any personal information. Balances cannot be confiscated or frozen, and transactions cannot be stopped from being processed. Every transaction must be explicitly approved by the account holder, and it is impossible to revert transactions once they are processed.

This unique payment rail operates as a full reserve banking system with an underlying self-sovereign scarce digital asset. This combination creates unparalleled value in specific circumstances. It eliminates the possibility of banking crises that are characteristic of fractional reserve banking (Bitcoin operates as a full reserve banking system). It prevents monetary debasement that can lead to hyperinflation and the periodical demise of fiat currencies. It also prevents other types of political intervention that could result in the seizure and/or restriction of access to balances. Another advantage of Bitcoin is that vendors are freed from the costs associated with dealing with fraudulent credit card payments because transactions are irreversible.

Accounts and transactions in the Bitcoin network are semi-anonymous. Each account is just a random alphanumeric string, but the entire Bitcoin ledger is transparent and can be monitored by anyone. This reduces privacy, but it offers a foundation where participants can easily be audited. Accusations that Bitcoin is a great system for money laundering and criminal activities are completely unfounded because the ledger is completely transparent and authorities have technological capabilities to tie the anonymous accounts to individuals. However, privacy can be built on top of the Bitcoin protocol with the introduction of secondary network layers and custodial services (similar to traditional banking).

It is very important to understand that Bitcoin's and Ethereum's utility as payment rails (and Ethereum's more extensive utility as a fully programmable platform) are fundamentally tied to their respective monetary policies. Issuance is just a subsidy, and without it the network will need to operate as a profitable business with a cash flow that is entirely dependent on network fees. For this reason, the revenue collected from fees is the most important metric to determine the sustainability of a non-inflationary monetary policy. Circumstances around Bitcoin that reduce incentives from operating directly on-chain are a potential threat to its security model. We are observing new situations that are causing such degradation of the on-chain utility of the Bitcoin network. The incentive for users to transact directly on the network is being diminished by the tokenization into Ethereum (wrapped Bitcoins), by the introduction of custodians (like PayPal), and traditional banking services who will soon be entering this space. If these trends continue I suspect that the only activity that will end-up happening on-chain will be done by whales sporadically transacting to "hodl" and the occasional settlement from institutions.

Protocol Persistence and Permanence

Bitcoin as a scarce digital asset is only truly scarce if no one is able to make changes to the established maximum supply of 21 million coins. Its determined scarcity only matters if it can sustain any type of attack seeking to destroy or corrupt the network that defines and operates its supply. Its immunity from operational interference is only meaningful if governments and other powerful institutions are utterly incapable of making changes to the protocol and/or its operation. In other words, all of the monetary and operational rules established by the protocol are only valuable if the protocol itself is persistent and permanent. Bitcoin's protocol achieves persistence and permanence through decentralization and network effect.

Decentralization is one of the most discussed aspects of Bitcoin, but it is still the least appreciated by critics. There is nothing blatantly appealing about decentralization, but it is the key to protecting the protocol's integrity; it is a means to an end. It assures that no one is able to control or manipulate the protocol without network consensus, which is a process that generally defines how the overwhelming majority of participants must agree with any modifications made to the protocol. The protocol operates as a living organism embedded on the internet. Decentralization is what allows Bitcoin to operate without a CEO, a headquarters, or employees. It does not abide by any jurisdiction. Decisions and changes are only possible through network consensus.

Decentralization allows Bitcoin to be considered a democratic self-sovereign system. The inexistence of a ruling authority protects the system from abuse and/or mismanagement. It is why scarcity cannot be corrupted. It is why anyone, no matter how old or young, rich or poor, honest or lawless, can have a Bitcoin account; no one has the authority to stop transactions or confiscate balances. At the same time, the sheer number of computers operating the Bitcoin network maintains these properties by making it virtually immune to any form of attack seeking to disrupt it. This combination has cemented Bitcoin on the internet in a way that proponents consider its properties to be immutable and indestructible.

Consensus Algorithms and “Mining”

"Mining" is somewhat of a misnomer and it is a confusing term used to describe the "transaction processing" mechanism created for Bitcoin that is known as Proof of Work (PoW). The term was coined after Satoshi Nakamoto used an analogy in the Bitcoin whitepaper to describe incentives given to participants responsible for processing transactions. I have included the full excerpt below:

> “By convention, the first transaction in a block is a special transaction that starts a new coin owned by the creator of the block. This adds an incentive for nodes to support the network, and provides a way to initially distribute coins into circulation, since there is no central authority to issue them. The steady addition of a constant amount of new coins is analogous to **gold miners** expending resources to add gold to circulation. In our case, it is CPU time and electricity that is expended.
>
> The incentive can also be funded with transaction fees. If the output value of a transaction is less than its input value, the difference is a transaction fee that is added to the incentive value of the block containing the transaction. Once a predetermined number of coins have entered circulation, the incentive can transition entirely to transaction fees and be completely inflation free.
>
> The incentive may help encourage nodes to stay honest. If a greedy attacker is able to assemble more CPU power than all the honest nodes, he would have to choose between using it to defraud people by stealing back his payments, or using it to generate new coins. He ought to find it more profitable to play by the rules, such rules that favour him with more new coins than everyone else combined, than to undermine the system and the validity of his own wealth.”

In a nutshell, Satoshi needed to come up with a way to allow new transactions to be processed without the involvement of a central entity. To be more specific, the goal was to completely eliminate the need of a trusted/authoritarian entity that is traditionally responsible for either

directly processing transactions or assigning who gets to process transactions. Enter Proof of Work.

The idea behind PoW was to create a computational problem that is hard to solve but that can be easily validated. The needed input and expected output to this problem is published to the entire network, and whoever gets to solve the problem first is awarded the rights to process a batch of transactions limited to 1 MB in size. These batches are known as blocks. Participating in this process requires hardware and it consumes electricity, so an economic incentive mechanism was necessary. Transaction fees are awarded to block processors, but the system could not rely exclusively on fees (especially in the early days). This is where the minting of new coins comes into play; the protocol effectively mints new coins and awards them to whoever manages to add a new block to the network. When a new block is published, all network participants validate it to make sure the computational problem was solved properly and that all transactions within that block are valid. The addition of a new block also generates a new computational problem and it uses information from the newly added block as input. A new input requires a new answer to be formulated and this is the source of the word “chain” in blockchain. The protocol adjusts the difficulty of the computational problem such that on average only one correct answer is found every 10 minutes. Therefore on average every 10 minutes a new block is added to the chain and at this rate Bitcoin was originally capable of processing ~4 transactions per second. This limit has since improved to ~6 transactions per second due to changes in the protocol (it is theoretically possible to process even more transactions, but this is what we observe in practice).

Now that we understand better what Bitcoin mining is, and why the system actually *needs* to issue new tokens, we can revisit the analogy to mining. It is catchy and expresses the process where new tokens are created, but it is a misleading analogy and it is the cause of much confusion to people who are still learning basic concepts about cryptocurrencies. It is fundamentally different from real world mining in two ways:

1. **The sole purpose of real world mining is to acquire new resources.** The gold extracted from mines is not a byproduct nor is it an artificially created incentive used to promote a different goal. **The sole purpose of crypto mining is to process transactions in a decentralized fashion.** The new tokens created in this process are more akin to newly minted currency, and having to do so is a necessary evil needed to promote an alternative benevolent goal. In other words, the minting of new coins is a negative byproduct. It is a subsidy needed to secure the network via PoW until transaction fees become high enough to provide enough revenue to finance the network operation.
2. Unlike real world mining, more bitcoins cannot be created by adding more miners to the system. When more miners join the network, the system adjusts the difficulty of the problem in order to maintain processing 1 block every 10 minutes. This is a key concept used to promote Bitcoin's superior stock-to-flow model when compared to gold.

Proof of Work also served a different role in the early days of Bitcoin: it was an effective mechanism to distribute bitcoins. When Bitcoin was first created, there were only a handful of people who actually owned any tokens, and crypto exchange services were non-existent. PoW allows anyone to acquire bitcoin by simply connecting to the network and operating as a miner. Miners did not need to interact with anyone who owned bitcoins, and they did not need permission from anyone to join the network. All they needed to acquire bitcoin was access to a mining software that was freely distributed on the internet. Mining as a distribution mechanism has become a lot less important with the prevalence of exchange services and an ever increasing multitude of traditional financial vehicles that provide exposure to bitcoin.

<TODO: expand on Proof of Stake>
A resource intensive process can be justified in the absence of a more efficient system that achieves the same goal. Once that changes, the merit of the term "resource intensive" is lost, and it becomes appropriate to call it wasteful. Bitcoin maximalists will never accept this because the PoS security model is dramatically different. However, the basic premise is simple, and it should not be so controversial. PoW uses the cost of mining (hardware + electricity) to secure the network, while PoS uses the cost of capital (via locked ether balance) to do it in a way that is not resource intensive. Not only is it more efficient, but it also aligns the interests of validators and stakeholders. Trains could use electricity to power a steam engine, but they don't because efficiency matters. That would be objectively wasteful, and it is a perfect analogy for comparing Bitcoin's PoW against Ethereum's PoS.

Cryptocurrency Scarcity

Anyone who is insisting cryptocurrencies are not scarce does not understand how the concept of scarcity works in this asset class. The value of a cryptocurrency is derived from a combination of the code, computers, people and amount of money that is participating in the network. It is the fusion of all these elements that defines scarcity and the impact it has on each unique cryptocurrency.

Using Bitcoin as an example it is possible to explain how scarcity functions in the context of most cryptocurrencies. Bitcoin uses computational power to establish the security of the protocol. It can be broken down in two distinct categories: the number of distinct nodes, and the mining computational power (known as the network’s hashrate). Nodes are like messengers that send requests from users to operators and retrieve information from operators back to the users. Nodes do not process transactions, but they ensure the communication between users and operators is undisrupted. It does not cost much money to operate a node, but it is important that nodes exist in large numbers that are independently operated. This is what protects the network from attackers trying to take it offline.

Operators are the computers responsible for processing transactions, except they are actually called “miners”. Bitcoin uses a clever combination of cryptography, economics and networking to establish a resource intensive mechanism that allows transactions to be processed in a

decentralized way by providing financial incentives to participants. Long story short: it costs money to operate as a miner (miners spend several million dollars every day to participate in the operation of the Bitcoin network). They do it because they are remunerated by the network with a combination of transaction fees paid by users and newly minted bitcoins created by the protocol. Crypto-mining is what prevents transactions from being reverted and/or censored. At the time of this writing the Bitcoin network has over 10,000 individual nodes, and a total mining computational power that consumes the equivalent of almost $50 million worth of electricity per day (using the US average electricity cost of 13.19 cents per kilowatt hour).

When a person buys a bitcoin for the first time, he/she becomes a new member of the network as a participant who can now send and receive bitcoins. What is perhaps even more important, many participants extend their support for the network into the real world by advocating for its value proposition; participating in the Bitcoin network is also a social phenomenon.

Finally, the demand for Bitcoin has an indirect impact on the security capabilities of the network. Miners are partially financed by the issuance of new tokens, which happens at a fixed rate denominated in bitcoins. This means that the higher the price of bitcoin is, the higher the financial remuneration for miners will be. Ultimately this attracts more miners to the network and results in greater protection against the reversal and/or censorship of transactions.

Anyone could copy the Bitcoin code, make slight changes to it and deploy a new crypto called “FunkyDonkeyCoin”. It would be a worthless network with a single participant, secured by nearly zero computational power. There is only one reason why anyone would possibly want to buy a donkey token: for the comedic/meme value of having something called FunkyDonkeyCoin because it sounds funny and it uses a picture of a silly looking cross-eyed donkey as its symbol. “Dogecoin” is a real life dog-themed version of FunkyDonkeyCoin. It was created as a joke, but it has surprisingly gained popularity over time and it has reached over $70 billion market capitalization. Most pundits agree that this valuation is not sustainable, but it still speaks volumes about the impact of network effects on cryptocurrencies. Nearly everyone who is "invested" in dog themed coins is interested in only one thing: flipping it for a quick profit before it crashes. There are no fundamentals, and zero conviction behind these assets. In other words, every single investor is waiting for their chance to rug someone else.

Cryptocurrency Valuation

Investors must ask themselves the very difficult question of what is determining the price of cryptocurrencies. Is it monetary policy, utility, decentralization, security, scalability, network effect? What general valuation methodology can be applied to cryptocurrencies and what is the weight that each of these components have on the value of the native token of each network?

Understanding crypto valuation methodologies must start with the premise that Bitcoin's code can be copied, but the network of computers, and the community of developers, users and enthusiasts cannot. These factors are what drives the fundamentals of cryptocurrency networks. A project like Dogecoin is almost completely devoid of fundamentals, and it is the digital equivalent of tulips (albeit a much improved version of it). However, Bitcoin and Ethereum have extremely strong fundamentals that are bound by unwritten social contracts composed of a mixture of Ethos, Pathos and Logos motivators.

Each cryptocurrency uses its social contract to derive a narrative. This is the basis for investor's conviction in the underlying asset of each network. It is what drives the price up during bull runs, but most importantly, it is what sets the floor during bear markets. The stronger the social contract, the stronger the narrative is, and the stronger conviction becomes. The power of this narrative affects investors' confidence, which is what drives valuation of monetary networks. Ironically, this is ultimately a system of trust.

<TODO: the role of social contracts and legitimacy needs to be explored in more detail.>

A commonly used valuation methodology is to utilize network effects to determine the underlying value of the network. The basic idea behind this asserts that the more participants a cryptocurrency attains, the more valuable the network (and its underlying asset) become. For this reason, Metcalfe's law has been used to determine the valuation of cryptocurrencies. Metcalfe's law states that "the value of a telecommunications network is proportional to the square of the number of connected users of the system". This helps to establish a foundation to elaborate valuation, but it is too abstract and insufficient in order to provide concrete numbers. However, there is a simplistic way to estimate the value of these assets: it requires separating monetary value from operational value.

Monetary value refers to the properties of cryptos that make them eligible to operate as a form of currency or store of value. It is imperative for this type of asset to be virtually indestructible and reasonably scarce. This is why monetary value primarily relies on persistence, permanence and a sound monetary policy. It is easy to estimate the minimum addressable market of monetary assets by adding up global money supply with the market capitalization of gold. Global M2 money supply (money in physical form, digital cash equivalents and other less liquid forms of money like time deposits) is estimated to be around $100 trillion. The market capitalization of gold is approximately $10 trillion. That makes the total addressable market value of monetary assets worth at least $110 trillion. This is disregarding any monetary premium that may exist in other asset classes such as equities, real estate and commodities (and their respective derivative markets). Therefore, the real number representing money's addressable market is likely a lot higher than the simple calculation presented here.

Operational value is based on the functionality and scalability properties that allow for cryptos to function as platforms that can provide a wide variety of cloud services including banking (financial and payment processing), data storage, supply chain and product traceability, information privacy, e-commerce, etc. Cloud services must provide utility and be able to handle

transactional volume. The valuation derived by operational aspects should be driven by cash flow models. To put numbers into perspective, the market capitalization of the entire banking industry is only around $8 trillion.

Persistence is crucial for monetary assets; it is the reason why it is significantly more valuable than transient operational utility, but these are not mutually exclusive properties. The concept of network persistence is one not often explicitly discussed, but its impact on monetary properties makes it the most important aspect contributing to the valuation of cryptocurrencies. Persistence is another way to express the expectation of integrity, indestructibility and longevity of the network and the digital assets operated by it. In practical terms it means that when a person makes an investment in an asset that only exists in digital form, it must be accompanied with the expectation that the asset (and by consequence the network that is operating it) must be virtually immune to economic, political and social disruptions over an indefinite length of time. Decentralization, security and network effect are key elements of network persistence, and it is why scalability and operational utility is less important with respect to monetary value.

Decentralization and security are components of persistence and permanence. They are important because they imply that the underlying digital asset will persist against any form of attack (individual, social, political and/or economic) through an indefinite amount of time. This is what is needed for a cryptocurrency to be valued primarily on its monetary properties as opposed to its operational utility. Bitcoin's scarcity value proposition is also important, but it is second to persistence and permanence.

Bitcoin's ossification contributes to its perceived permanence. The idea that it is a finished product that does not need changes to maintain its security and scarcity is a powerful component of its monetary narrative. It reinforces the concept that it is secure and protected from potential flaws that could be introduced by protocol modifications. It is rightly attributed on a short term perspective, but it will be challenged once Ethereum enters its own ossification phase which should happen within the next 2-3 years.

Bitcoin and Ethereum have remained on top of the crypto market capitalization rank primarily due to their persistence properties. Other cryptos are focused on technological aspects, but they are sacrificing persistence for transient operational capacity, and this has a significant negative impact on the monetary value of these networks. Money as a raw asset must be indestructible, and in digital terms this can only be achieved by the combination of decentralization and network effect. This is why we have seen (and will continue to see) waves of cryptocurrencies rotating through the ranks while Bitcoin and Ethereum remain on top.

Bitcoin is valued almost exclusively as a monetary asset, while Ethereum introduces value in the form of a cloud service without sacrificing monetary properties. In fact, the additional functionality of Ethereum actually reinforces its strength as a monetary asset. Ultimately, the demand for transacting directly in the Ethereum network along with protocol improvements that will reduce operational costs and increase transactional capacity will allow for ether to become a deflationary asset.

What is Ethereum?

Extend Bitcoin's vision of a permissionless, inclusive, censorship resistant monetary system to a fully programmable digital economy where value can be expressed, transacted and automated in any imaginable way. In short, Bitcoin allows for the decentralization of money, and Ethereum allows for the decentralization of:

- Money
- Financial services and markets
- E-commerce
- Digital arts and intellectual property
- Authentication and digital rights
- Intermediation services
- Communication services
- Cloud computing services
- Data integrity and storage
- Organizations
- Governance systems

Ethereum and ether are not the same thing. Ether is the name of Ethereum's native digital asset. No one can buy Ethereum; when someone says they have Ethereum, what they really have is ether. A simplistic analogy would be to say that Ethereum is to ether what traditional banks are to the dollar. However, it is more appropriate to define what Ethereum is by comparing it to the internet. The internet is just a network of computers running a *data* agnostic protocol to exchange *information*. Ethereum is a network of computers running a *value* agnostic protocol to authenticate and exchange *programmable digital property*. Both sound generic and unimpressive, but society has restructured itself around the internet, and in the next couple of decades Ethereum will have a similar effect upon it.

The Ethereum network is value agnostic because it allows anyone to create, issue and transact any type of digital asset (not just ether). This is very different from the Bitcoin network because it only allows users to transact its native asset which is also called bitcoin. Bitcoin with a capital B refers to the network, while bitcoin with a lowercase b refers to the asset that can be bought and transacted in the Bitcoin network.

Ethereum has one more trick that Bitcoin does not have: it allows for users to create and execute computer programs with the same awesome properties that make Bitcoin's value proposition so compelling: they are inclusive, transparent, trustless, permissionless and censorship resistant; these programs are called "smart contracts". They are operated autonomously by the network, and they can interact with any digital asset defined within it. This opens up a world of possibilities. One of them is the ability to function as a global financial system that is in many ways far superior to the existing traditional financial systems which are siloed, inefficient and prone to questionable administrative practices and fraudulent activity.

In a nutshell, Ethereum reduces the friction of almost any activity that requires trust and/or permission by hosting a fully programmable money (ether) and the ability to create an infinite variety of digital assets while achieving a scalable infrastructure with a sustainable net zero issuance monetary policy. These properties make ether the world's preeminent monetary asset by a large margin. There is nothing in the world that can be compared to ether with the same network effect of Ethereum. The rise of ether will generate an enormous amount of disruption to all pre-existing forms of reserve and monetary assets - it effectively makes them obsolete. It will suck out the monetary premium from gold, bonds, equities, real estate and eventually Bitcoin.

Ethereum is founded on the same principles and mechanics of Bitcoin, but it has expanded them into a generic computing framework. It is similar to an operating system like Windows, but it is simultaneously running on thousands of computers around the world and it is practically impossible to shut down or disrupt. For this reason, Ethereum has been nick-named "the world's computer" by Vitalik Buterin (Ethereum's co-founder and thought leader). What are the practical applications of Ethereum? For starters, it allows users to interact with any digital asset in the same way that Bitcoin operates bitcoins. Users can also create programs that are transparent and guaranteed to be executed according to the original source code. This provides a foundation for vastly superior banking and financial systems that automate the intermediation that would normally be done by institutions. The framework provided by Ethereum has already been proven to work effectively as a more efficient substitute to remittance systems like Western Union, security exchanges like the New York Stock exchange, collateralized debt markets like mortgages and as a system to define and exchange digital/intellectual property like art. These are just a few of the use cases that Ethereum is capable of; the most important of all is "ultra-sound money" in the form of ether.

It may be difficult to see the value of reducing friction caused by trust and/or permission. These are often things we do not think about because they carry hidden costs and risks. Let's look at how the traditional banking system is affected by trust and permission. First a banking institution must be given permission to operate by the government. Then, customers must trust the institution and the system as a whole before they desire to open an account. The bank needs to give each individual permission to open the account upon request. Customers must trust the bank management will operate in a manner that does not jeopardize the balance under custody. They must trust that the bank (and consequently the ruling governmental authority) will always give them prompt access to their balance while preventing bad actors from accessing private information and/or charging their account without permission. This means that every transaction must be permitted by the bank and the government. Finally, individuals must also trust that the authorities will administer fiscal and monetary policies effectively to ensure fiat money's status as legal tender and that it retains purchasing power. Each individual step adds real costs and operational risks to traditional monetary and financial systems. They are manifested through a multitude of fees, the risk of temporarily/permanently loss of access to balances and the continued devaluation of money through inflationary forces. The inefficiencies of these systems are also reflected directly in the cost of goods and services (payment processors charge vendors, and that cost is transferred to consumers via higher prices).

Below is a list of a few other ways that modern society is enduring costs associated with systems that are overly reliant on trust, permission and a lack of transparency:

- The periodical collapse of fiat currencies around the world. The average lifespan of a FIAT currency is only 27 years (the methodology used to calculate this number may be slightly overstating reality; it needs to be revised). Decentralized cryptos are the better choice over fiat currencies anytime inflation becomes worse than volatility. In the absence of crypto, people were left with no choice, but they will soon start rejecting new versions of the old same thing. As monetary policies fail, Bitcoin and Ethereum will benefit from an increase in adoption. It is monetary natural selection at work, and it has never been more relevant.
- Our reliance on communication and social platforms that can arbitrarily dictate who is given permission to use them (Twitter, YouTube, Facebook, Google, etc). We are also entrusting these corporations with our personal data, which can potentially be used/shared without our permission.
- The annual cost of counterfeit products sold on the internet is estimated between $300-600 billion. The total annual cost of counterfeit products is estimated to be approaching $2 trillion. Many of these products are channeled through trusted vendors, and the consumers are unaware they are purchasing counterfeits.
- Financial service providers can arbitrarily choose who/when gets access to their services in order to favor their own interests. This has been manifested by the notorious stonewalling that traditional banks have enacted against cryptocurrency assets, and more recently by the Robinhood-Gamestop scandal.
- The lack of trust in the validity of our electoral process (at least by part of the USA population) has caused social resentment and political instability. Other countries have allegedly violated public trust and produced fraudulent election results.

What is Ether?

Ethereum (the network) is not trying to be money, but it utilizes ether exclusively for its monetary properties and not because it can be magically burned by an imaginary engine of sorts. It costs money to participate in the network as a miner, and their engagement is financially incentivized with ether. Any activity in the Ethereum network requires the use of block space. Block space is a scarce resource, therefore participants who wish to transact must use ether to bid for it. These interactions are utilizing ether as a monetary medium of exchange. In the long run, as the price of ether goes up, the ether denomination of gas prices goes down. That happens because no one is using ether as gas/oil, and it is actually being used as money. In the short run you may see the opposite occurring because of the dynamic between the portion of block space demand that is inelastic and the increased demand for ether and block space that move in tandem during market cycles.

Why are so many people insisting ether is like oil or some other form of commodity, but not money? The crypto space has a few analogies that have been used to describe

technical/economic mechanisms that are somewhat tricky to understand: mining, Ethereum's gas, and the infamous analogy between ether and oil. Crypto "mining" is not like real world mining. It's purpose is not to extract resources, but it is rather a decentralized mechanism to process transactions. Newly minted BTC tokens are not "mined", they are minted by the protocol and awarded to operators. Furthermore, it is impossible to change the total mining output of the network... adding/removing miners does not affect the mining output. Ethereum's "gas" is not like fuel (it cannot even be stored). It is just a computational metric that is more akin to the distance a car must travel, but not what actually makes it move. The fuel is electricity and it must be paid for with ether. When you transact you are also paying for the "car" which is the use of all active mining hardware/validators for a fraction of a second. And ether is just money.

To better illustrate why ether is not like oil let's imagine I have a car with a 14-gallon fuel tank and I want to take it on a road trip. The car is not aware of the price of gasoline, and it would not travel any farther if the price of gas would double the next day. That's because the intrinsic utility of oil has nothing to do with its monetary value. The car needs gas because of its particular physical properties and how the internal combustion engine is designed to utilize it. If I want to drive from point A to point B and it takes a full tank to get there, it will take that full tank no matter what happens to the monetary properties of gas/oil. This is fundamentally different from how Ethereum uses ether. When transactions are paid with ether, it exchanges hands from users to miners because it is a valuable and highly liquid asset (it is transferring wealth); this is how money works.

It is always better to understand the principles of cryptoeconomics than to rely on analogies. If you put too much weight on these simplified analogies, you will not understand the economic actuality behind them. This is a source of confusion in the crypto space, and it is used to support false narratives. From an economic perspective, ether is money. Once you understand this, you will know that the narrative that Bitcoin and Ethereum are not competing because they are different things is analogous to saying fax machines do not compete with the internet.

It is important to stress that ether is a natively defined asset, and as such, counterparty risk is eliminated. This is not the case with wrapped Bitcoins and other tokens that are based on assets that require the involvement of a custodian (like tokenized US dollars). This, along with the fact that users need ether to engage in any activity in the Ethereum network (transactions fees can only be paid with ether), makes ether a natural choice to be used as a monetary asset. However, the beautiful thing about ether is that it is not "just money". It is a mixture of a scarce monetized commodity, money, bond, growth technology stock and consumable resource.

- **Monetized Commodity**: Ether is becoming more scarce and will continue to do so with the transition to Proof of Stake (PoS) and EIP-1559. Ethereum does not have a supply cap, but it does have a roadmap for a sustainable security model. If cash flow (transaction revenue) becomes greater than the minimum viable security budget as established by the PoS yield curve (approximately 1-2% market cap), then it will become deflationary.

- **Currency**: Ether is used as a unit of account and medium of exchange to pay for every activity in Ethereum. It is also used in the same way for venture capital related to ICOs, IDOs and for digital art commercialized via NFTs. Ether is also used as collateral in the DeFi space and new monetary uses will continue to emerge. It is an immature form of digital money, just like Bitcoin is an immature form of digital gold. Some people prefer to say that ether is just a utility token. However, a utility token is just a narrowly scoped form of money. Not only is ether's scope within its digital economy growing, by the end of 2021 users will be able to pay millions of merchants with ether through Paypal and Visa. We have never seen the adoption of a new form of money grow organically. New forms of money have always been imposed by authorities. What would the organic growth of money look like? It would look like ether.
- **Ethereum's digital economy**: Ethereum has limitless use cases and it is already generating economic activity with real world usefulness. Ether is the native monetary asset of Ethereum. It is defined directly within the code of the Ethereum protocol, and that makes it the only asset that completely eliminates counterparty risk. Ether's value will benefit from acting as the monetary asset of choice for Ethereum. That means that as Ethereum's economic activity grows, the velocity and/or purchasing power of ether must also increase.
- **Bond**: With Proof of Stake users need to lock up ether to receive a yield in return. It is similar to how bonds work, except that the risks involved with staking ether are negligible and ether is an appreciating asset.
- **Growth Tech Stock**: Ethereum is essentially operating as a cloud based service provider, and the network will be entirely operated by stakers who happen to be the recipients of transaction fees. Ethereum provides a service - that service is paid with ether. The network is controlled by holding ether that is staked. The more valuable the service provided by Ethereum becomes, the more users will be willing to pay for transactions and the more valuable the protocol and the ether token become. It is not exactly the same as holding a stock, but there are a lot of parallels.
- **Consumable Resource:** The introduction of a fee-burning mechanism included in EIP-1559 effectively destroys the majority of transaction fees. Fees must be paid with ether, therefore destroying transaction fee revenue has an unavoidable effect over the supply of ether. The more users Ethereum has, the more fees are paid, and the more ether is destroyed. If the amount of ether destroyed is greater than the issuance rate, then ether becomes a deflationary asset.
- **Full reserve banking model**: This is a bit of a stretch, but it is a potential end-game for Ethereum. It can serve as the base infrastructure and reserve asset for a full reserve banking system. In a nutshell: a consortium of banking companies can be formed to standardize a framework to hold and stake ether under custody in exchange for wrapped Ether (wETH). Customers deposit ether, banks exchange it for wETH, and stake the original ether. Resting balances of wETH on customer accounts can receive a cut of the staking rewards. Banks get their profit model, customers get to spend wETH with traditional banking services and potentially receive a share of the staking yield. Customers could also have access to a yield curve based on variable reserve requirements. This would allow banks to create money (which is actually good for the

economy when it is done with moderation), but for the first time ever customers would have the choice of how much risk exposure they are comfortable with. This dynamic could help to establish a form of democratic check and balances system that discourages moral hazard. Ether could become a godsend to banks in the land of negative yields. It's a pipe dream, but not entirely impossible. Don't forget that the US OCC has essentially given banks the green light to take the first steps in this direction (US banks have been approved to use the Ethereum blockchain for their operations AND they can become validators... yup this happened).

Ether is Money

Even though we can draw parallels between ether and a multitude of assets, at its core, ether is money, and it is more likely to become a global currency than BTC. But why?
Ether was created to finance the security of the network. It was designed to provide remuneration to miners (ether is used to PAY miners, and issuance is a form of subsidy). It's sole purpose is to function as a utility token, which is just a form of money that has a very narrow scope. This is true for all PoW networks.

With that in mind, it is important to understand that money is not a binary attribute. It is a spectrum; Utility tokens are at one extreme end of it, and a global currency is at the other.

The interesting thing about ether is that its scope as a form of money is expanding rapidly within Ethereum's digital economy. It has become the preferred asset used to facilitate economic activity involving ICOs, DAOs, DeFi, NFTs. Ether is the native currency of Ethereum (it is NOT a commodity, and never was
one).

There are several reasons why users chose to use ether as money:

1. It eliminates counterparty risk.
2. It has excellent monetary properties.
3. It is aligned with Ethereum’s ethos.
4. There is a new class of Ethereum multimillionaires eager to spend, reinvest and speculate their new fortune (in the form of ether) directly in the Ethereum economy. They are setting the economic incentives for content creators and entrepreneurs to use ETH as money, and the rest of the market must follow.

The market is starting to view ether as a competitor to bitcoin despite the original narrative that these were entirely different types of assets. There is now an understanding that the service layer of each network is vastly different, but that both assets have excellent monetary properties. So which one will accrue value more quickly?

The value of money is determined by the same market laws as any other asset/good/service: supply and demand. Supply is in part determined by the issuance model, which is unsurprisingly referred to as monetary policy. ETH's 2.0 monetary policy + EIP-1559 will result in a diminishing

total supply while at the same time reducing float due to staking. It is also important to note that the switch to proof of stake uses the cost of capital (in the form of ether) to secure the network. There again, ether is being used for its monetary properties.

In addition, and perhaps even more importantly, is the fact that Ethereum's economy will generate additional demand for ether because of its role as a native currency. These factors will also promote further speculation. Accruing value through all these supply/demand dynamics will consequently increase liquidity and stabilize prices, which is what is needed for it to continue to expand its monetary scope and mature into a global currency.

Ethereum has created a self-reinforcing mechanic for the appreciation of ether. Investors are beginning to understand this dynamic, and it is becoming self-evident that the flippening may be inevitable.

Bitcoin vs Ethereum Monetary Policies

One of the aspects central to Bitcoin's value proposition is its immutable monetary policy, and the determination of a maximum supply cap of 21 million bitcoins. However, the idea that Bitcoin's monetary policy cannot be changed is a myth. It is a false narrative that takes for granted that the issuance subsidy will no longer be necessary at some point, but there is no way to objectively assert this. There is no divine power preventing the monetary policy from being changed. If the security model for Bitcoin was jeopardized because of insufficient cash flow to miners, then Bitcoin's monetary policy would be the first thing on the chopping board to go in order to remedy the situation.

Bitcoin's monetary policy has been proven to work very effectively under specific circumstances. Since its inception, the price of Bitcoin has increased exponentially, and up until recently, there was a lack of alternative payment rails that were capable of transacting with bitcoin. Most importantly, Bitcoin has been generally perceived as the strongest and arguably the only institutional grade store of value asset in the cryptocurrency market. These dynamics are changing and the sustainability of Bitcoin's monetary policy is entering uncharted territory. Sooner or later the price of Bitcoin will no longer double (or more) every four years. When this happens, the issuance subsidy will be effectively reduced on each halving event. Transaction fees will have to fill the gap left by the reduction of issuance, but the incentive to use the Bitcoin network is being reduced by the introduction of so many alternatives systems (wrapped bitcoins on Ethereum, PayPal, Visa, Mastercard, commercial banks and even tech giants like Apple and Google are likely to join the custodial and payment rail crypto party). To make matters worse, Ethereum is starting to be recognized as an institutional grade store of value asset. It is a mistake to assume these factors will be inconsequential to Bitcoin's security model and monetary policy.

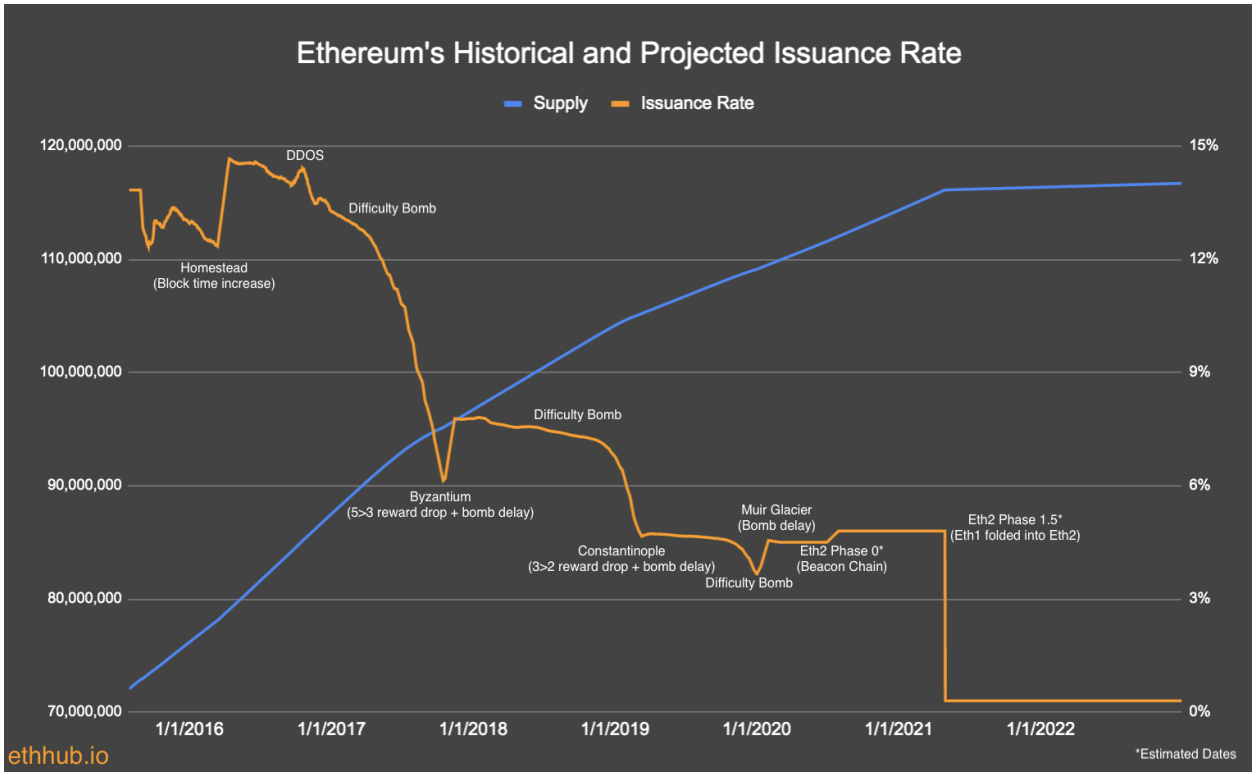
The criticism against Ethereum's dynamic monetary policy and ETH 2.0's proposed perpetual ~1% issuance may seem strong on the surface level, but they crumble once all the pieces of the

cryptoeconomic puzzle are put together. For starters, if an argument can be made that the financial incentives to operators (miners/stakers) are excessive or insufficient then an argument can be made for the implementation and execution of a dynamic monetary policy. Additionally, an arbitrarily picked issuance schedule determined during the genesis of a new highly complex system is unlikely to be efficient through its lifecycle. Bitcoin's monetary policy provides the certainty of stability and protection from abuse, but it sacrifices the possibility of efficiency and jeopardizes longevity. It would be like if a captain of a ship pointed it in the direction of its final destination, set the throttle, then fell back to his cabin for a nice bottle of chianti and hoped that the ship would arrive safely. There would be no one at the helm to navigate the seas, no one to make sure it stayed on route, no one to avoid the storms or to take advantage of currents. Ethereum investors argue that this is a bad approach to something as critical as monetary policy.

With respect to how Ethereum is administering its dynamic monetary policy: No evidence has ever been presented to suggest developers have been enriching their pockets by keeping issuance at current levels. Developers are stakeholders and the Ethereum Foundation holds a lot of ether (debasing ether is against their self interest). There is a great misunderstanding that the ones who are adjusting issuance are the recipients of the new tokens or that they are somehow colluding with miners. Is there any documented case of this happening? No.

Ultimately, the 1-2% nominal issuance rate of ETH 2.0 must be interpreted as a maximum issuance level; the net issuance is anticipated to be near zero or potentially negative thanks to EIP-1559, multiple scaling solutions and high demand for Ethereum’s block space. In the worst case scenario, ETH 2.0 will have a 1-2% issuance rate while providing at least 2-3% staking yield to long term holders via staking. The market is still skeptical these changes will be executed successfully and/or that they will provide an equivalent level of security to PoW. However, as we approach the full realization of new features, it will become self-evident that Ethereum is a superior store of value when compared to any other asset (including Bitcoin).

Cryptocurrency investors need to understand this: Networks can have absolute certainty of future supply (e.g. BTC’s 21M hard cap). Networks can have absolute certainty of security (e.g. ETH's minimum issuance subsidy). It is impossible to have both.


Ethereum's Historical and Projected Issuance Rate
Supply
Issuance Rate
120,000,000
110,000,000
100,000,000
90,000,000
80,000,000
70,000,000
15%
12%
9%
6%
3%
0%
DDOS
Difficulty Bomb
Homestead
(Block time increase)
Difficulty Bomb
Byzantium
(5>3 reward drop + bomb delay)
Muir Glacier
(Bomb delay)
Eth2 Phase 1.5*
(Eth1 folded into Eth2)
Constantinople
(3>2 reward drop + bomb delay)
Eth2 Phase 0*
(Beacon Chain)
Difficulty Bomb
1/1/2016
1/1/2017
1/1/2018
1/1/2019
1/1/2020
1/1/2021
1/1/2022
ethhub.io
*Estimated Dates

“Code is Law”

"Code is law" is a myth. Code is the equivalent to policemen, but people are the legislators/judges. Social consensus is supreme. When enough dissent arises, the chain splits. That is how it should be, and if BTC did not abide by that, it would have died a long time ago.

Anytime a network exploit is recognized as a systemic risk (overflow hack is a perfect example), social consensus should rule because the alternative would be the total destruction of value. Each time this happens the network's reputation takes a hit. BTC and ETH have done it once.

Ethereum was never rolled back or reorganized the blockchain. BTC maximalists use this as a talking point without knowing exactly what the DAO hack was or how it was resolved. ETH was *never* rolled back. The process to resolve the hack did in fact compromise immutability, but it did not have the same collateral damage as a rollback, and it was as decentralized as possible.

First, we need to determine what a crypto rollback is. In a nutshell, a rollback is a coordinated reversal of one or multiple validated transactions. In the context of blockchains, it is achieved via a 51% attack or by retroactively forking the network. The end result is such that specific transactions are effectively erased and the chain is reorganized (causing a portion of mining rewards to be redistributed, and potentially other transactions to be reverted).

DAO Hack and Resolution

The DAO smart contract had a security vulnerability that allowed child contracts to be created and drain the funds from the parent contract. Per the DAO contract rules, funds transferred to child contracts couldn't be withdrawn until 41 days had passed. This gave the developers and the community time to decide if/what type of action should be taken. An on-chain community vote was passed with 87% supporting a hard fork that would forcibly replace the compromised DAO smart contract with a new refund contract that allowed users to retrieve ether with their DAO tokens. The community had signaled approval, but all protocol changes (including consensus rules and/or modifications to monetary policy) are implemented via a process called EIP. The DAO hack resolution was no different, and it was defined in EIP-779. When the fork went live, a small fraction of network participants decided NOT to upgrade their nodes (this later became known as Ethereum Classic). Users who were unaware the original vote or fork took place now had the chance to sell their ETH tokens for ETC. The free market decided which network was the most valuable and ETH was the clear winner.

Long story short, all users were given the opportunity to express their opinions, formally vote on a resolution and then later vote with their money; no user balances were lost/rolled back as a result of the irregular state change.

Ethereum’s Bull Market Catalysts

1. **Wide adoption of Layer 2 solutions**: these will amplify the base layer block space value while encouraging further network adoption by a significant reduction of fees. A successful integration with DeFi protocols will dismiss the "Ethereum killers" theory and consolidate market confidence.
2. **EIP-1559**: this enhancement involves a new methodology to determine base transaction fees, along with flexible block sizes and transaction fee burning (partial destruction of transaction fees). It will improve security and user experience by stabilizing transaction fees, as well as introduce a deflationary mechanism to ether.
3. **Sharding**: scale Layer 1 bandwidth, compounding the effect of Layer 2 solutions, further consolidating Ethereum's dominance in the DeFi space, making it feasible to introduce new use cases and eventually increase transaction fee revenue.
4. **The switch from PoW to PoS**: discontinuing Proof of Work (PoW) will eliminate the operating costs related to mining and will allow for a reduction of issuance (~4% will be reduced to ~1%). Money that was previously allocated to buying mining equipment will be redirected to the acquisition of ether. Staking ether will remove it from circulation for extended periods of time. Operating costs will be negligible, allowing validators to withhold most of the ether revenue. This will be the greatest bull market catalyst in the history of cryptocurrencies and it will eclipse the effect of Bitcoin’s halvings.

The importance of Ethereum’s switch to PoS cannot be understated. It effectively has twice the supply side impact of a Bitcoin halving event (which has been the main catalyst for crypto bull runs). For those who are unfamiliar with the term Bitcoin halving, it is the periodical reduction of issuance by half that happens approximately every four years. In addition, Ethereum’s remaining 1% issuance will be counterbalanced by the destruction of ether introduced by EIP-1559. This will undoubtedly result in a net issuance rate that is inferior to Bitcoin’s (possibly becoming a deflationary asset). That would have been enough to establish this event as a huge bull run catalyst, but there are even more positive factors involved. Participating in the consensus mechanism of Ethereum’s PoS will require ether to be locked for an extended period of time in exchange for an annual yield of at least 3% (it will likely be significantly higher than that for the foreseeable future). This means that not only will ether become the most scarce institutional grade asset in the world (even more scarce than Bitcoin), it will also provide a mechanism to obtain returns with negligible risk involved. The end result will be a simultaneous supply shock (caused by issuance reduction EIP-1559’s fee burning) and demand shock (caused by PoS staking returns).

All of this will be achieved while providing an arguably more secure and sustainable system when compared to Bitcoin. If Ethereum successfully implements these changes, then a narrative shift away from Bitcoin into Ethereum will likely follow and it could result in a self-reinforcing cycle perpetuated by media frenzy (traditional and social). However, at least some Bitcoin maximalists will be naysaying all the way through and past a market cap flip. Do

not get caught up in their narrative. If you are not sure, then it is better to rebalance your portfolio proportionally to market caps. This is a smart risk mitigation strategy that has a huge upside. If none of these enhancements are successfully deployed and Ethereum turns out to be a failure, then you would only have reduced your gains by 20-30%.

Digital Gold vs Ultra Sound Money

One of the problems with Bitcoin is that it is aspiring to become a currency without its own economy. It is traded as a speculative asset without much utility built around it and without a clear vision of how it will evolve into a mature currency other than through continued speculation backed by the narrative that it is a better version of gold. Ethereum's scalability roadmap combined with its programmable capabilities allows it to issue and operate with an infinite amount of digital assets, and service its own automated digital economy at a global scale. Ethereum also has a plan for a sustainable net zero issuance monetary policy (potentially becoming a deflationary asset). This means that ether is becoming more scarce than bitcoin, but it also functions as frictionless money that is capable of facilitating economic activity while maintaining the key value propositions that make bitcoin so compelling (inclusiveness, trustless, permissionless, censorship resistant). Consequently, ether is shaping up to become a much better asset in terms of facilitating economic activity and preserving wealth; this is why the Ethereum community has attributed the term "ultra sound money" to ether.

When Bitcoin supporters started to recognize the protocol's limitations, they shifted the narrative from "electronic cash" to "digital gold and/or reserve asset". There is another big problem with this narrative. The need for an alternative reserve asset emerged from fiat money's deficiency as a wealth preserver. If fiat money was not an inflationary asset and controlled by sovereign nations, then there would be no need for gold (or any other kind of reserve asset). Ideally, money should be frictionless, non-inflationary (inflation is a rather inefficient method to incentivize economic activity) and backed by its own economy. If it accomplishes all of these things well enough, then there would not need for alternative reserve assets. The very idea of a reserve asset becomes obsolete in the presence of a pristine monetary asset. Ethereum is fostering its own virtual economy, and it will help ether assume a position as the world's most pristine monetary asset. Ether is redefining the very concept of money, but for now it is still just a tiny snowflake on the tip of an iceberg.

People who do not understand the value of Bitcoin and Ethereum are focusing almost exclusively on who is using it, and what it is being used for. Scammers, criminals, terrorists and degenerate gamblers looking for a quick way to make money, engage in illegal transactions or finance nefarious activities - all of which will someday be stopped by governments or collapse from its own weight. To some degree, this is all true, but they are missing the big picture: Bitcoin and Ethereum are working very effectively as platforms that have legitimate use-cases, and they are vastly superior when compared to traditional monetary and financial systems.

The “Silk Road” had an important role in building up Bitcoin’s value and proving that it could be effectively used as a permissionless, censorship resistant medium of exchange. People who were saying that Bitcoin was useless because the activity on the network was driven by criminals buying drugs missed the bigger picture: it worked as an effective form of money and payment rail that could also be used for legitimate reasons. Extend this logic to how Ethereum can be used to operate as an autonomous settlement network for an endless diversity of tokenized real world assets, such as fiat money, gold, stocks, real estate, etc. It achieves this on a global scale with a significantly higher efficiency, speed and security than any other system. It can serve as a cheap and fast alternative in the remittances market. The ICO craze has proved that the Ethereum network can serve as a global platform to raise capital for startups (initial coin offerings are the crypto equivalent to IPOs). The DeFi wave is proving that it can be used for more sophisticated financial mechanisms and can operate as a global collateralized debt market. Non-fungible tokens (NFTs) are providing a mechanism to allow artists to capitalize their creative power while providing art enthusiasts with instant authenticity verification. The developers, entrepreneurs and artists who are exploring these new possibilities are breaking through uncharted territory. This is the wild west in an alien world, and things are going to be a little crazy on the frontlines. It would be entirely unreasonable to expect that “real world” companies would be the ones pushing ahead… it would be too risky. Where there is high risk, there is the potential for high reward, and this is why so many speculators have been attracted to the frontline of crypto. The so-called scammers and degenerate gamblers are paving the way and uncovering the solid ground where the rest of the world will be able to build the foundation of a new economy. It may take a few years, but use cases that are proven by explorers and guinea pigs will eventually make their way to traditional enterprises and achieve consumer mass adoption.

The digital world is becoming more important than the physical world. This is already true for younger generations, and there is no reason to believe this trend will slow down. The virtual space is a world of ideas, art and self-expression. It is borderless, boundless and not constrained by physical limitations of the real world. It is the only place where perpetual economic growth can be sustained without destroying our precious planet. If we are aspiring to build a virtual economy, then we are going to need a lot more than just digital gold. We need a virtual dimension where anyone can create value, and where value can be expressed and transacted in any form. This is what Ethereum’s building blocks (tokens, NFTs and smart contracts) have to offer: a virtual dimension that transcends physical limitations. If you believe the narrative that the world will continue to become digitized, and that virtual reality will be perhaps one day even more important than physical reality, then you might want to consider the idea that Ethereum is shaping up to be the bedrock of the metaverse.

Ethereum Killers

There are many cryptocurrency projects that are attempting to replicate Ethereum’s success story. These emerging cryptocurrencies have been properly nicknamed “Ethereum killers”. Most

of them are focused on improving transaction scalability by making various compromises to decentralization. The scalability approach taken by these projects rely on delegating processing authority to a restricted number of validators. This is an approach that Ethereum deliberately chose not to follow because the community concluded it would be detrimental to decentralization. They instead decided to pursue the proverbial “hard road” with the goal of reducing the inefficiencies of the Proof of Work consensus mechanism (mining) without sacrificing decentralization. The most significant protocol changes related to this were marketed as “Ethereum 2.0”. The level of complexity of ETH 2.0 caused long delays, and it was the source of skepticism regarding the viability of such design and the competence of Ethereum’s developer community. However, the first phase of these updates was finally deployed at the end of last year, and a full implementation is expected within the next two years. ETH 2.0 combined with Layer 2 solutions will allow for hundreds of thousands of transactions to be processed each second. Long story short, scalability is coming soon.

Scalability is very important, but it is not the only aspect that matters; the monetary value of a cryptocurrency is determined by its perceived security/decentralization properties and the combination of its multifaceted network effects (computers, users, developers, capital and applications). Ethereum may be currently behind in terms of scalability, but it is miles ahead regarding network effect and decentralization. It is true that Bitcoin is even more decentralized, but it is too restrictive. The argument for Ethereum is that it achieved a balance between scalability, functionality and network persistence.

It is also important to understand that cryptocurrency platforms targeting financial dApps (decentralized applications) are fighting the equivalent force of a black hole when it comes to Ethereum’s foothold and user retention in this space. Bigger players, with bigger bags of money, are entering this market and they will not settle for anything other than the top dog. This pattern reinforces Ethereum's position as the premium financial system, which ends up attracting even bigger players and resulting in the black hole effect. To make matters even more complicated, financial dApps are more valuable when they are surrounded by a rich and diverse variety of digital assets and other natively defined dApps. Ethereum continues to attract more developers despite the current high transaction costs because its user base is larger than all other networks combined.

It is VERY difficult to duplicate Ethereum’s network effect because both the platform and dApps must have established full trust from their user base - stability, security and confidence in the network’s persistence must be proven through the test of time. This is not to say there is no space for other networks to grow, but just don’t get your hopes high that they will be taking Ethereum’s stronghold as a financial system. There are other use cases that do not require the amount of decentralization, security and persistence offered by Ethereum. Networks that focus on these are more likely to be successful and coexist in the long run. Gaming, ERP interoperability, CRM integration, supply chain and authenticity verification are good examples of such use cases. Remember that alternatives with cheap transactions have existed for a while and they have barely touched Ethereum’s dominance (Eos, Tezos, Neo, Qtum, Iota, Vechain, Lisk, Ark, Stratis, and dare I say... Tron). New contenders include Cardano, Polkadot, Elrond,

Zilliqa, Solana, Cosmos, Algorand, Hedera Hashgraph, Avalanche, Binance Smart Chain, Trias and Fantom. In total, there are at least 22 different projects aspiring to become Ethereum Killers, but in reality, they are primarily competing with each other. The more Ethereum Killers there are, the less likely any of them will actually kill Ethereum because they are fragmenting the network effect needed to do it.

To the surprise of many, Bitcoin is ironically trying to compete in the DeFi market after years of criticism against Ethereum's programmable capabilities. There are a few major issues with this endeavor. Bitcoin is extremely restrictive as a programming platform, and it was not designed to host digital assets other than bitcoin and it does not have a viable scalability roadmap. All of these restrictions were branded as "intended features" that ensured the stability and security of the protocol. As a result, Bitcoin's version of DeFi will be operated on a secondary network that will be entirely responsible for code execution while retrofitting some of Bitcoin's functionality to use it as a settlement layer for digital assets. Perhaps the most concerning part of this is the reliance on a Layer 2 network called "Lightning Network" for scalability. This is not only equivalent to trying to fit a round peg on a square hole, but it also makes significant compromises to security and user experience that are inherent with the Lightning Network. In a nutshell, the Lightning Network works like a staging area where users must commit funds in advance. They also have to be online to receive payments and they must monitor the network at all times to prevent the other party involved from potentially stealing funds. There are other problems with it, but this alone should be enough to deem it as significantly inferior to Ethereum's user experience.

The undeniable truth is that, at least for now, all roads are leading to Ethereum. Bitcoins are getting tokenized and other cryptocurrency networks are creating bridges to it. Tokenized bitcoins are just bitcoins that are held by third party custodians who issue the equivalent of redeemable notes as digital assets on the Ethereum network. Bridges are one way network connections that allow other networks to interact with Ethereum. Ethereum is the common denominator; it is the center of the cryptocurrency universe. At this point it is almost a given that other cryptocurrencies must connect to it in order to be relevant. They have a much better chance of being successful if they are capable of operating as sidechains. Sidechains are networks similar to Layer 2 solutions that interact with Ethereum to provide additional bandwidth and storage capacity, albeit having a much higher degree of trade-offs (diminished security). It is also possible for competitors to operate as Layer 2+ networks that are bridged to Ethereum's native Layer 2 protocols.

Maximalists often compare cryptocurrencies to the internet protocol as an analogy to reinforce the idea that this is a winner takes all environment. They fail to recognize a critical difference between the internet protocol and every smart contract protocol in existence today: the internet does not explicitly restrict network bandwidth in software as cryptocurrencies do. This fundamental technical difference is what allowed the internet to scale organically and without the possibility of contentious disagreements over what the software imposed limits should or should not be. It also meant there was no justifiable benefit for fragmenting the internet protocol. Unlike the internet, Ethereum's block space is a finite resource, artificially constrained via software, and

facing global demand for multiple use cases. This creates a very complicated dynamic that almost inevitably means the cryptocurrency market will be operated by multiple networks. It may be acceptable to pay a few cents for financial transactions, but it would not be justifiable to pay the same amount for each individual transaction needed to track a product's supply chain history. Alternatively, it may be acceptable for Americans to spend a few cents on transaction fees, but the same would not be true for someone living in a country where wages can be as low as a dollar a day. The most important use cases, involving the highest amount of monetary value, will be secured by Ethereum, but the world will need cheaper alternatives to complement it by serving different purposes and attending to less privileged individuals who are willing to compromise persistence for scalability. This is why the overall demand for Ethereum's block space is more likely to overflow to other networks, rather than be drained out.

As of 2021-04-17, Ethereum has been sustaining high transaction costs. A simple transfer can vary between 10$-$20 while complex transactions involving DeFi and NFT's can cost several hundred dollars. Ethereum has been heavily criticized over this issue, and critics are using it to support the narrative that Ethereum cannot scale and that it will be eventually taken over by better and faster networks.. This idea needs to be addressed taking into consideration that Ethereum's decentralization model, and current decentralization metrics are vastly superior when compared to any other smart contracts network. This means that, much like Bitcoin, Ethereum's primary intrinsic value is of monetary nature; it is ultra sound money. Also important is the fact that gas cost is a function of supply and demand. If the price goes up it is because supply is down or demand is up. Ethereum is not *making* transactions expensive (the supply of Ethereum block space has not changed); transaction cost has been driven exclusively by an increase in demand for Ethereum block space aka users wanting to transact in the Ethereum network.

The price of block space is extremely high because the demand is extremely high, and users think it is worth the price they are paying for. This also means that Ethereum is attracting the highest net worth participants in the smart contracts space, and they are attracting other high net worth individuals and institutions. However, many lower net worth users are sticking with Ethereum despite high fees because they believe Ethereum will execute its scaling roadmap successfully.

A successful implementation of all roadmap items would allow Ethereum to process anywhere between 100,000 to 1,000,000 transactions per second. That is about 7,000 to 70,000 faster than what it is now, and it will result in negligible transaction costs. Some users have decided to switch to a different network (and endure the cost of doing so). This is the "overflow effect". Most of it will be reversed back to Ethereum once transaction costs have been lowered due to Layer 2 solutions and furthermore with sharding. This is the "sponge effect" because Ethereum will suck most of the overflow back in as transactions become cheaper. The high fees should not have a meaningful impact on the price of Ethereum as long as the scaling roadmap gets successfully implemented within a reasonable timeframe.

The general expectation is that Layer 2 solutions will have gained enough traction by the end of 2021 to allow transaction fees to become 10-100 times cheaper (on average, accounting for a mixture of L1 and L2 costs). It is a smarter choice for developers and participants to move to Layer 2 solutions than it is to migrate to an entirely different network. Migrating to Layer 2 solutions requires only one transaction, while migrating to a different network will require a transaction to move funds to

an exchange, then a trading fee must be paid to convert tokens (which also triggers a taxable event), and finally another transaction must be made to move the new tokens out of the exchange.

The Trend Is Your Friend

There is a trend happening that is becoming harder to ignore: investors, the media and influencers are shifting their point of view and realizing Ethereum's potential. Raoul Pal is a renowned investor who became the unofficial crypto ambassador in 2020 when he declared he had sold all his liquid assets to go all in Bitcoin and Ethereum. He originally started investing exclusively in Bitcoin, but it did not take him long to understand the value proposition of Ethereum. His portfolio distribution was weighted proportionally to Bitcoin and Ethereum's market cap (80% and 20% respectively). Not long after, he announced intentions to increase his ether holdings, which indicated he was viewing it favorably in regard to risk reward ratio. In early May, Raoul disclosed that he owns more ether than bitcoin in his portfolio and a few days later he had this to share: "every single investor I have spoken to is shifting allocation to ETH over BTC. All our mutual friends and that billionaire finance circle…"

Lyn Alden is another brilliant investor and mental powerhouse who initially did not think investing in Ethereum could be justified, but she is also starting to shift her view and now understands that it has a justifiable risk/reward ratio to be included in a portfolio (although she is not personally invested in Ethereum as of 2-19-21). In her report, she had plenty of negative things to say about Ethereum, however many of her critiques were based on misconceptions about the Ethereum protocol and/or unfounded accusations that have been clarified by Bankless and the Ethereum community. Since then, she has recognized that Ethereum has the potential to outperform Bitcoin. I have a feeling she will be revising her analysis on Ethereum again in the future with an even more optimistic view, but maybe that is just wishful thinking.

The Winklevoss twins, Mark Cuban and Chamath Palihapitiya are also notorious billionaires who have become increasingly bullish on Ethereum and its digital economy. They are beginning to understand the relationship between ether as a monetary asset and Ethereum's digital economy as demonstrated by Mark Cuban's latest statement: "I own a lot of Ethereum because I think it's the closest to a true currency."

Social media influencers who could have originally been branded as Bitcoin maximalists are also shifting their narratives. Traditional media used to focus exclusively on Bitcoin, but they too are now starting to talk about Ethereum, DeFi and NFTs. The interest from institutional investors is growing exponentially. The largest traditional finance vehicle offering exposure to Bitcoin and Ethereum is operated by Grayscale via publicly traded funds. Most institutional investors are getting exposure to Bitcoin and Ethereum via Grayscale, and this is what they had to say about their customers: "Over the course of 2020 we are seeing a new group of investors who are Ethereum-first and in some cases Ethereum-only. There's a growing conviction around Ethereum as an asset class."

Even the Fed is starting to recognize the value proposition of Ethereum with respect to its ability to function as a decentralized financial system. Here are a couple of excerpts from an article recently published by the Federal Reserve Bank of St. Louis: "The term decentralized finance (DeFi) refers to an alternative financial infrastructure built on top of the Ethereum blockchain. DeFi uses smart contracts to create protocols that replicate existing financial services in a more open, interoperable, and transparent way." "I conclude that DeFi still is a niche market with certain risks but that it also has interesting properties in terms of efficiency, transparency, accessibility, and composability. As such, DeFi may potentially contribute to a more robust and transparent financial infrastructure."

All of this enthusiasm is backed by very strong network fundamentals that have a profound impact on the value of cryptocurrencies as described by Metcalfe's law. Ethereum's unmatched network effect and momentum can be measured by the number of active wallets, transactions, settlement volume, transaction fees revenue, nodes, users, developers and variety of decentralized applications. Bitcoin is still ahead on a few of these metrics, but Ethereum is closing the gap very quickly. This momentum can be sustained by scalability enhancements that are currently offered by Layer 2 networks, and further in the future by the compounding effect of Layer 1 scalability that will be achieved when Ethereum 2.0 is finalized.

MESSARI

Ethereum Quarterly Transaction Volume

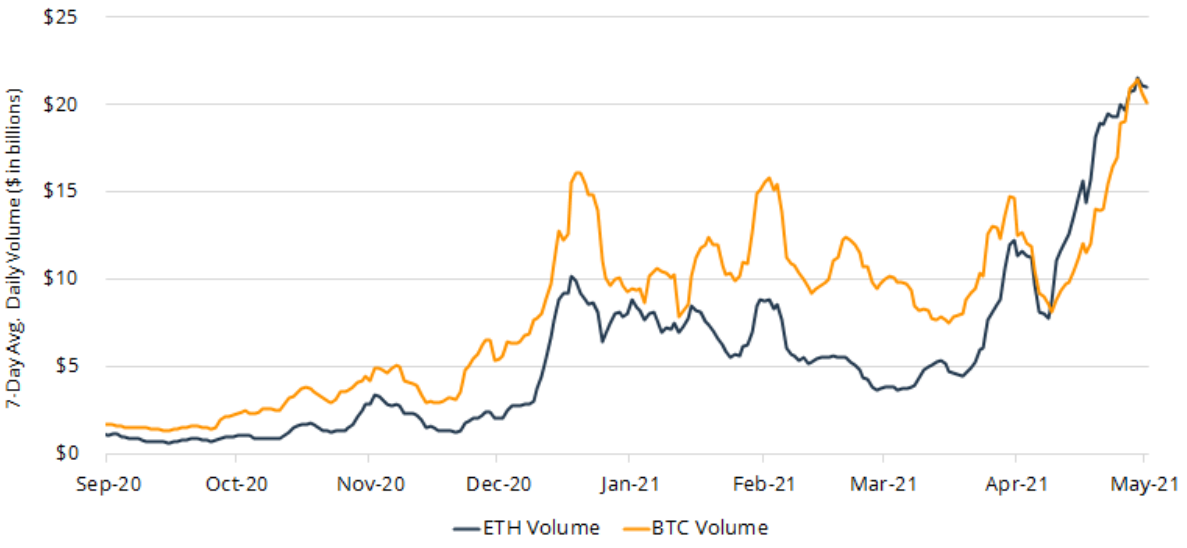
Ethereum's daily transaction volume exploded to start 2021. It settled $1.5 trillion in transactions in Q1 and is on pace to settle $6 trillion in 2021

Data as of: Apr. 1 2021
Source: Messari, CoinMetrics

Note: Includes ETH plus stablecoins on Ethereum

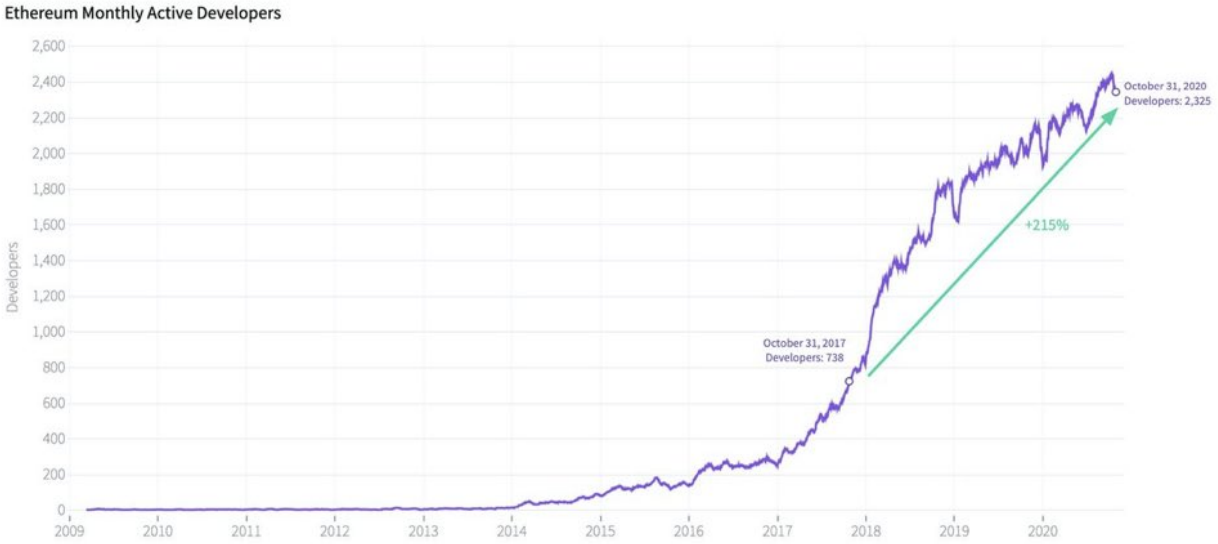
MESSARI

Ethereum Trading Volumes Have Begun to Surpass Bitcoin



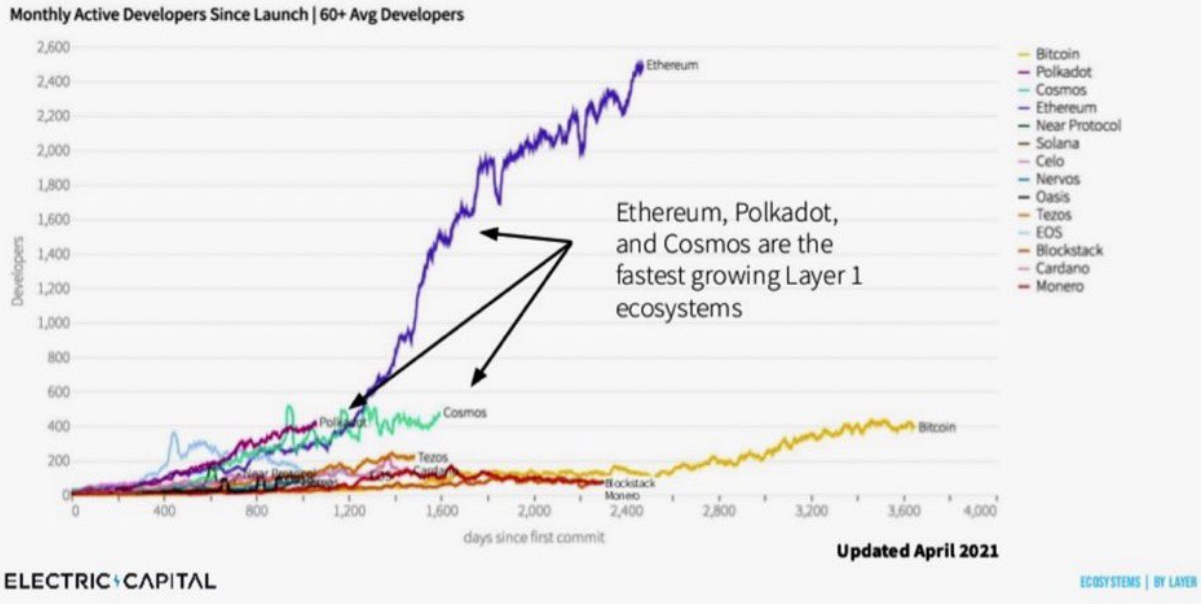
Source: Messari

ETHEREUM MONTHLY ACTIVE DEVELOPERS HAVE GROWN 215%+ IN 3 YEARS



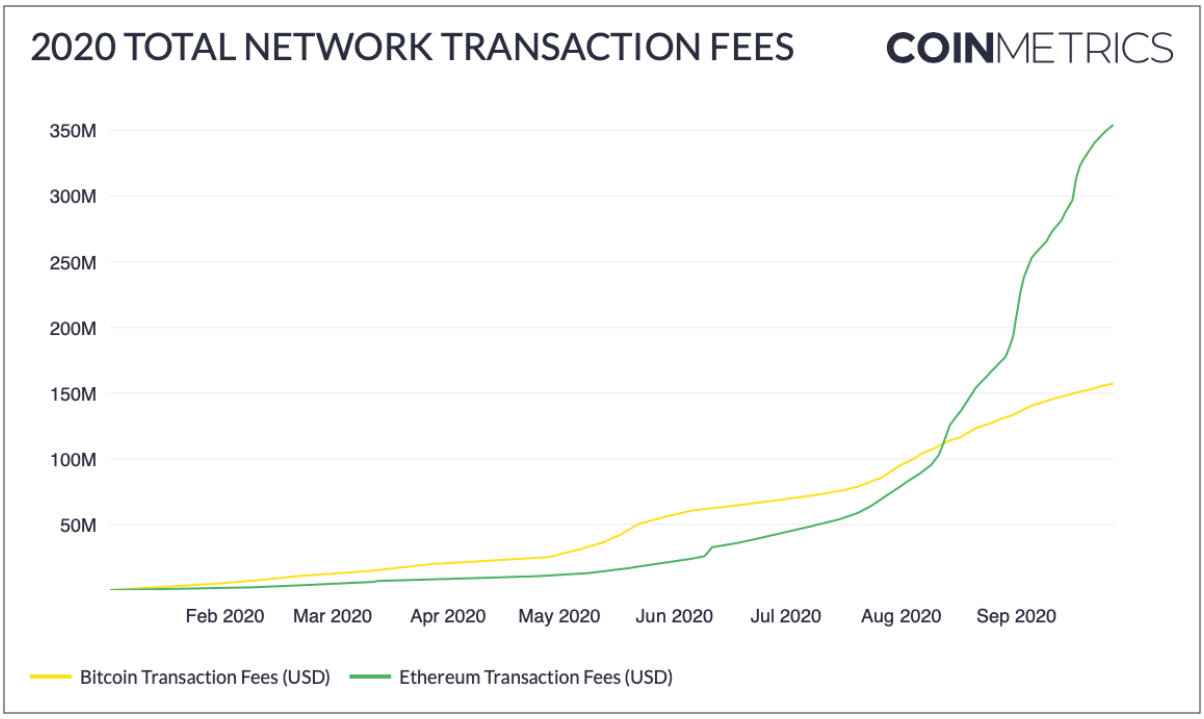
ELECTRIC CAPITAL *Monthly active is the sum of unique developers who were active in the preceding 28 days*

ETHEREUM, POLKADOT, AND COSMOS OUTPACE OTHER LAYER 1 PLATFORMS IN GROWTH



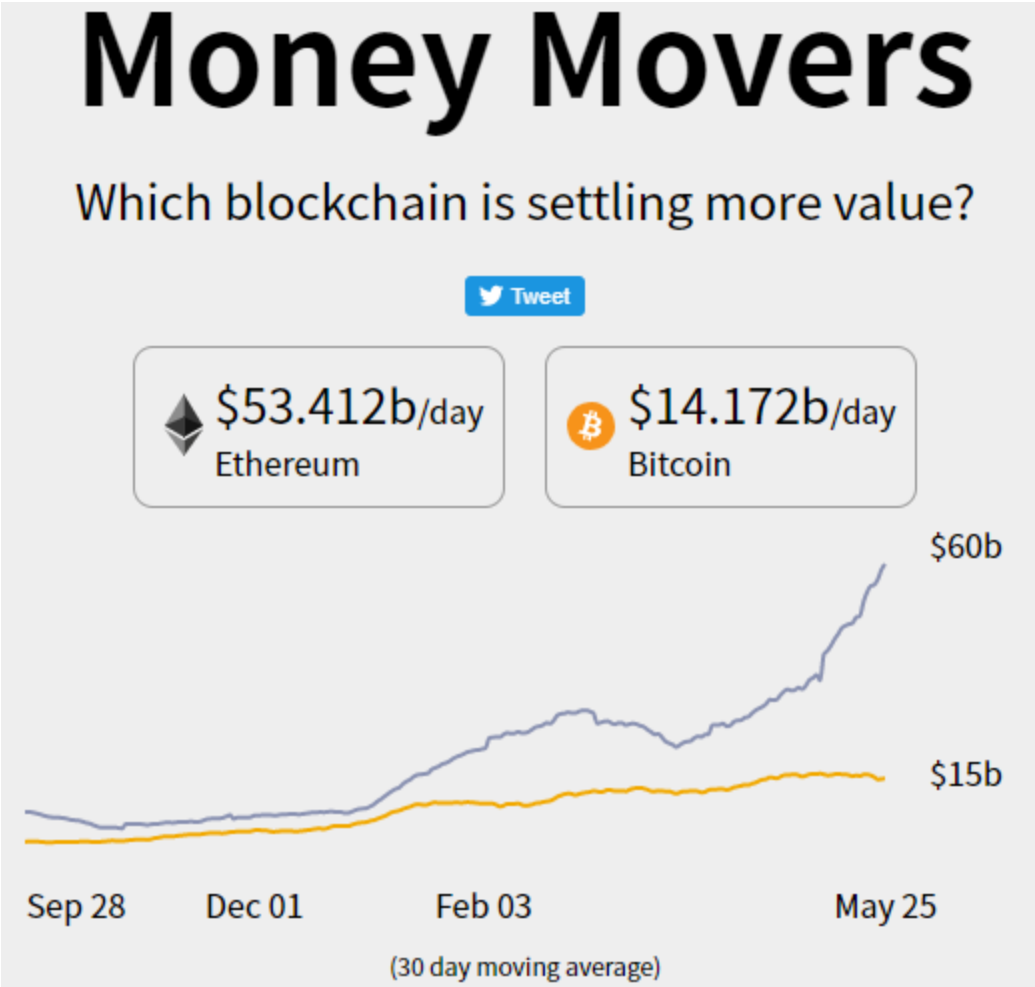
ELECTRIC CAPITAL

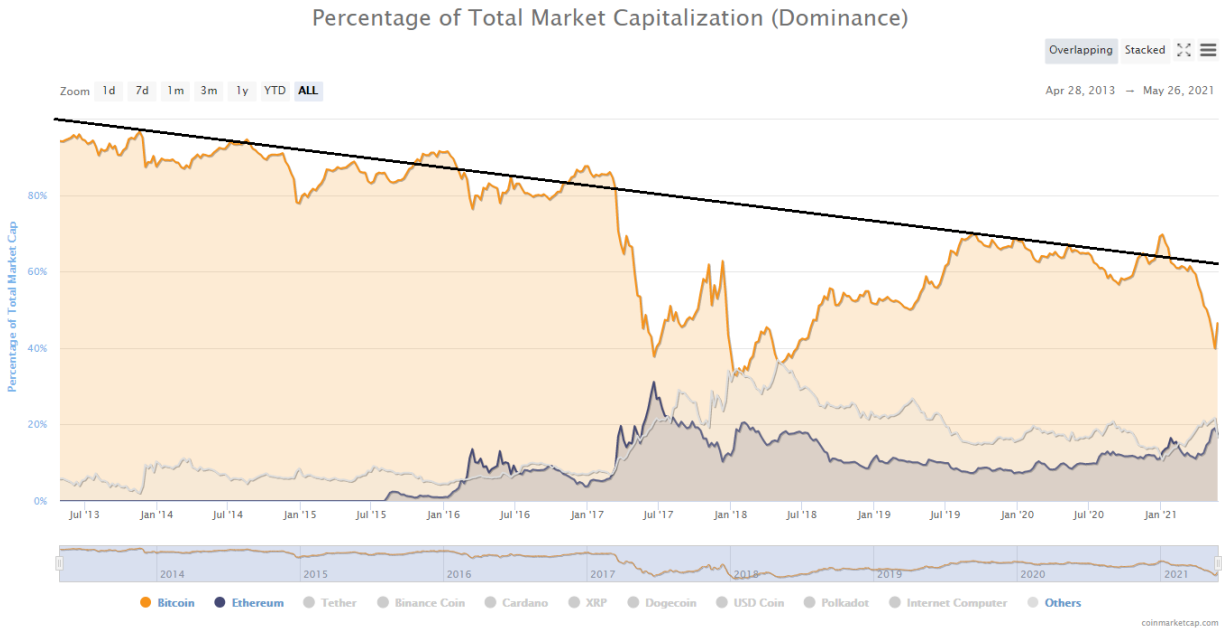
ECOSYSTEMS | BY LAYER


2020 TOTAL NETWORK TRANSACTION FEES
COINMETRICS
350M
300M
250M
200M
150M
100M
50M
Feb 2020
Mar 2020
Apr 2020
May 2020
Jun 2020
Jul 2020
Aug 2020
Sep 2020
Bitcoin Transaction Fees (USD)
Ethereum Transaction Fees (USD)

[Crypto Fees]

Name	▼ 1 Day Fees	7 Day Avg. Fees
Ethereum	$13,175,323.35	$20,649,098.00
Uniswap V3	$4,166,646.88	$4,414,852.26
Uniswap V2	$3,531,334.80	$4,319,065.96
Bitcoin	$3,011,970.34	$3,846,281.47
SushiSwap	$2,324,137.04	$3,286,456.74
Quickswap	$1,105,034.87	$1,194,121.61
Aave	$930,867.77	$1,285,156.32
Compound	$589,829.09	$547,831.63
Bancor	$372,620.09	$471,114.45
MakerDAO	$363,697.91	$390,877.92
Balancer	$250,513.79	$383,561.50
Ren Protocol	$114,553.11	$53,848.94
Synthetix	$109,861.47	$195,991.75
Futureswap	$54,192.47	$45,806.97
Curve	$51,651.16	$86,914.11
Dogecoin	$23,800.86	$28,760.73
Terra	$21,570.31	$22,673.13
Cardano	$19,785.15	$16,999.20


Money Movers
Which blockchain is settling more value?
Tweet
$53.412b/day
Ethereum
$14.172b/day
Bitcoin
$60b
$15b
Sep 28
Dec 01
Feb 03
May 25
(30 day moving average)


Percentage of Total Market Capitalization (Dominance)
Overlapping
Stacked
Zoom 1d 7d 1m 3m 1y YTD ALL
Apr 28, 2013 → May 26, 2021
Percentage of Total Market Cap
80%
60%
40%
20%
0%
Jul '13
Jan '14
Jul '14
Jan '15
Jul '15
Jan '16
Jul '16
Jan '17
Jul '17
Jan '18
Jul '18
Jan '19
Jul '19
Jan '20
Jul '20
Jan '21
2014
2015
2016
2017
2018
2019
2020
2021
Bitcoin
Ethereum
Tether
Binance Coin
Cardano
XRP
Dogecoin
USD Coin
Polkadot
Internet Computer
Others
coinmarketcap.com

Final Thoughts

Five years ago naysayers were screaming about how everything that is being done TODAY in the Ethereum network would never work. Now, Bitcoiners are trying to hijack the DeFi narrative while they are still calling Ethereum a scam, or that it is a platform for degenerate gamblers, or that the fees are too high and therefore it is useless, or that it can't scale, or that something else better is just around the corner to take its place.... you know... basically all the things that traditional bankers have to say about Bitcoin, maximalists are saying about Ethereum.

Bitcoin is gripping onto the idea that a fixed monetary policy is unconditionally better than a variable one, that no leadership is better than effective leadership, and that it is a finished product that does not need to be improved in order to remain successful. Ethereum, on the other hand, is being propelled by an extremely focused and effective leadership centered around a strong ideology, but also seeking pragmatic solutions to keep the technology moving forward without compromising the basic principles that are critical for ether to be considered sound money. Ethereum has the largest and arguably the most passionate community in the crypto space by a large margin. Developers and users understand the value of decentralization, but they also recognize its current weaknesses, and are tackling issues one by one.

Bitcoin’s narrative is simple, and this is perhaps its strongest advantage over Ethereum. As such, Bitcoin has an important role to play in the mass adoption of cryptocurrencies. Almost every investor in this asset class was initially lured in by the simplicity of Bitcoin’s narrative. Bitcoin will likely continue to increase in value; however, some traditional investors will never understand Bitcoin, and some Bitcoiners will never understand the much bigger value proposition of Ethereum. The complexity of Ethereum makes it difficult to understand, and almost impossible to quantify its upside.

The greater the impact a new technology can have on society, the more difficult it is to comprehend its potential. Ethereum has the potential to dramatically reshape human civilization to a degree that extends far beyond a new form of reserve asset. It could take decades for it to be fully realized, but society could be fundamentally restructured around Ethereum in the same way that it has been restructured around the internet. This would change the world in ways that we cannot possibly imagine today. If it happens, the moon will be just a pit-stop. The bull case for Ethereum suggests it is not stopping at the moon... it is not stopping on Mars... it is going straight out of the Milky Way galaxy in search of alien life.