Crypto Investment Thesis

2024-2025 Cycle

Abstraction Capital

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Abstract

Decentralized computing infrastructure is set to dramatically increase the efficiency of Western economies while minimizing human led corruption and systemic risk. Simultaneously, it will provide financial services to developing economies for the first time, enabling a global, deterministic, and permissionless financial system. The Bitcoin Halving, launch of multiple Bitcoin ETFs, as well as rising global liquidity conditions will trigger an expansion of crypto asset prices over the next 14-20 months. Macro trends seem to be coalescing in what will result in significant fiat monetary debasement over the next decade. This should bolster crypto returns as well as provide a strong narrative for investment.

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1 The Fundamental Value of Cryptographic Truth

1.1 Society and Truth

Human flourishing is directly correlated to the number of discovered truths about our reality. This statement rings true when one analyzes recent periods of human history.

After the collapse of the Roman Empire, civilization entered the Middle Ages and living standards plummeted. This period is defined by philosophers as "The Age of Faith," where the answer to most questions was "because God did it," and absolute truth was derived from the holy text of one religion. Religious institutions provided the social structure for society by which people organized. Living standards not only regressed due to lack of technological innovations, but also due to human led corruption of the prevailing institutions.

Next was the "Age of Reason" which began with the Renaissance. Marc Andreessen's Techno-Optimist Manifesto [1] presents a relevant quote from Marian Tupy:

"Our species is 300,000 years old. For the first 290,000 years, we were foragers, subsisting in a way that's still observable among the Bushmen of the Kalahari and the Sentinelese of the Andaman Islands. Even after Homo Sapiens embraced agriculture, progress was painfully slow. A person born in Sumer in 4,000BC would find the resources, work, and technology available in England at the time of the Norman Conquest or in the Aztec Empire at the time of Columbus quite familiar. Then, beginning in the 18th Century, many people's standard of living skyrocketed. What brought about this dramatic improvement, and why?"

The Renaissance was defined by the widespread implementation of the Scientific Method which resulted in the discovery of many absolute truths about our universe. These absolute truths, or scientific laws, allowed humans to predict the future response of arbitrary systems from defined inputs. This provided the foundation for an explosion of technology which ultimately resulted in the three Industrial Revolutions. We are on the precipice of the 4th Industrial Revolution that will be defined by many technologies, but I would like to focus on one: Cryptographic Truth.

When we discuss various decentralized (also referred to as trust-minimized) computing infrastructures such as cryptocurrencies, blockchains, and oracle networks, what we are really talking about are systems that generate Cryptographic Truth. Cryptographic Truth can be defined as some verifiable piece of information or computation that is as immutable as a scientific law[1]. Cryptographic Truth allows humans to create digital conservation laws[2], enabling a system of private property rights that are automatically enforced. These laws are transparent, unbreakable, and enable a system which is permissionlessly accessible by any human on our planet with an internet connection. Like scientific truths which can be verified by any human capable of reproducing an experiment, the capabilities of a cryptographic system can be verified by any human. The decentralized and open-source nature of cryptographically verifiable

[1] Although not as immutable as scientific laws, when trust-minimized infrastructures reach sufficient decentralization their growing network effect will render them tamper-proof for all intent and purpose.

[2] The first law of thermodynamics states that energy cannot be created or destroyed, only converted from one form to another. A digital conservation law enables information to be conserved.

systems creates a competitive dynamic where the winning protocols maximize positive externalities to greater society, while minimizing negative externalities.

The discovery of scientific truths such as Newton's law of gravity or Einstein's law of relativity have generated countless positive externalities for greater society. I argue that cryptographic truths will have a similar impact.

The most fundamental incentive of life is to multiply. Access to energy and technology to manipulate said energy into useful resources is what ultimately leads to a better standard of living for all. A higher standard of living increases the odds for life to achieve its base incentive.

As discussed in my Chainlink Investment Thesis, money is potential energy [2]. It is an effective tool to enable humans to provide value to society in different ways and still be able to attain the resources to live. When humans perform useful work for others, they are paid money which they can then use to initiate the action of others. This is a feedback loop where two systems interact. First, we have humans interacting with the natural world through technological innovations, which allow energy to be used more efficiently to produce work. Second, we have a human-to-human system – the economy – where humans interact with one another to achieve potential energy fungibility.

If scientific truth generates universal laws about physical reality that allow humas to more effectively use energy to improve our lives, *cryptographic truth generates immutable truths about the energy that humans are transferring between each other*. Whereas scientific truths might involve dimensions such as density, conductivity, or temperature, cryptographic truths could be the wealth of an individual, the outstanding loan balance between two counterparties, the number of units being created per day in a supply chain, or the exchange-volume-weighted price of a commodity. This information is tamperproof, allowing naturally untrusting 3rd party intermediaries to compose it into economic agreements that are deterministic and will execute based upon pre-determined conditions.

Private property rights create the foundation for modern society. If something is stolen from you, you have the right to take that person to court where the state, with a monopoly on violence, can subdue the counterparty and return your property. By providing citizens with individual freedoms and the assurance that their wealth will be protected, citizens are incentivized to complete tasks or create technologies that help others survive because they will be monetarily rewarded. The better those services or technologies, the more others are willing to pay for them. Without private property rights, humans would not be incentivized to innovate and accumulate wealth because it could be stolen from them at any instant.

The problem with today's economic system is that citizens are reliant on 3rd party intermediaries to collaborate and conduct commerce. Due to the lack of a firewall between the marketplace and government, the most successful companies can lobby government officials to change the rules to benefit themselves. Instead of a free market[3], we are left with a form of crony capitalism in which hostile,

[3] A "free market" is used here with some generalization. There are clearly instances where government regulation is necessary to provide the most fair and productive economic system for greater society.

extractive rent seekers create negative externalities for society. This leads to an immeasurable amount of energy that is lost due to opaque, corrupt, rent-seeking third party intermediaries in the global economy.

Cryptographic truth fundamentally fixes the problem of mismatched incentives between the market and greater society. By replacing rent-seeking 3rd party intermediaries with systems powered by Cryptographic Truth, humans are free to transact in a peer-to-peer fashion. Imagine a global, permissionless, transparent, and deterministic economic system for human collaboration. This system cannot be manipulated by anyone, and nobody is above the law – from the poorest citizen to the richest bank. Unlike Wall Street after the 2008 economic collapse, which main street ultimately paid for, financial gravity will treat everyone equally. A cryptographically powered economic system will unlock human innovation, minimize economic friction, and lead to a secular increase in global productivity growth.

1.2 Applications of Cryptographic Truth

A blockchain can be thought of as a bulletin board with a few key properties, per Ari Juels of Chainlink Labs [3]. Anyone can read the board, and anyone can write valid information to the board – it is universally accessible. Second, messages written to it have a strict, unchanging order. Third, it is unalterable, or tamperproof. Once information is written, it is engraved in stone and stays forever.

What are the benefits of an open, tamperproof bulletin board? Well, the information on the board could theoretically represent anything that mathematics can represent. Interestingly, this model is similar to how Stephen Wolfram conceptualizes our universe. In the Wolfram Physics Project, Stephen Wolfram presents a computational approach to developing a fundamental theory of physics. He defines the universe as a Spacetime Causal Graph, where each node in the graph represents the evolving state of every “atom” of space in the universe [4]. An “atom” of space has no property other than that it exists, as well as how it relates to every “atom” of space that it is connected to.

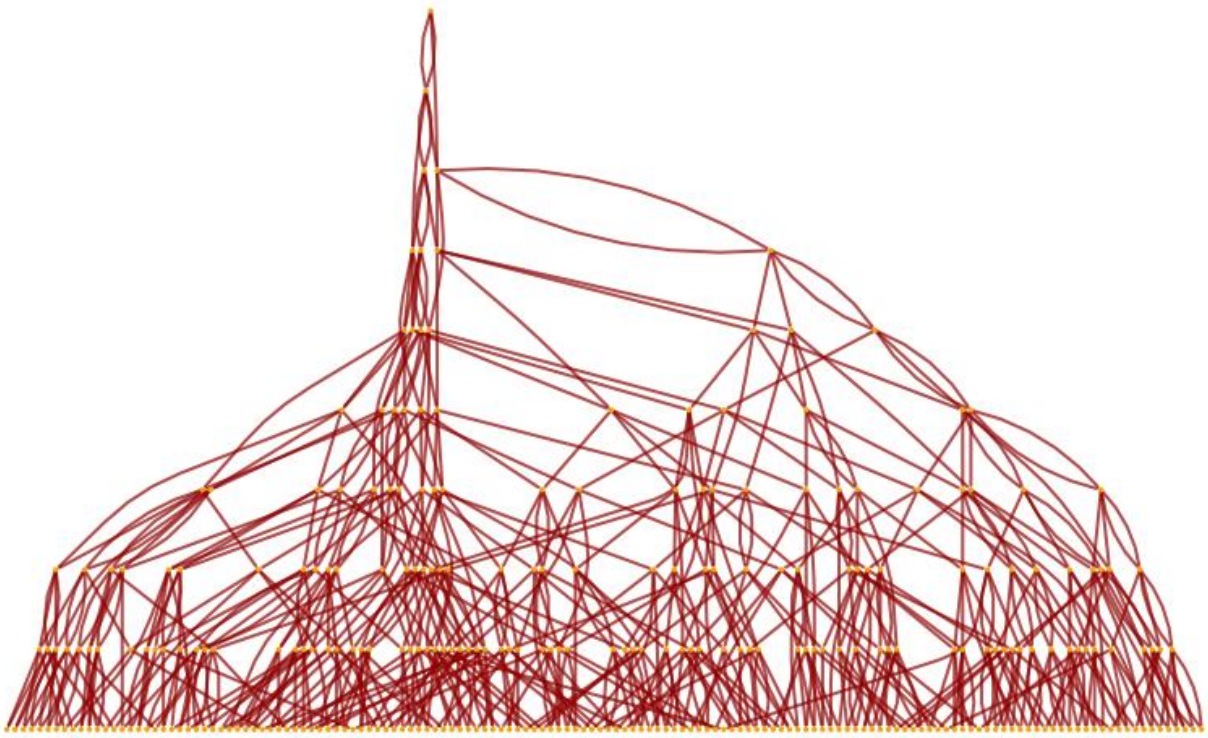


Figure 1 - Spacetime Causal Graph.

Replace “Quantum Excitation of a Field” with “monetary transactions,” and it is easy to see how a tamperproof causal graph could be highly valuable. One could theoretically define any arbitrary relationship between a set of individuals. Like the physical laws that dictate how matter and energy evolve over time, the relationships defined by cryptographic systems are unbreakable and will deterministically execute based on pre-defined conditions.

In 2009 the first implementation of Cryptographic Truth was created: The Bitcoin Blockchain. The first successful internet native money, Bitcoin enables humans to store their wealth in a fixed-supply, gold like instrument where they can send and receive stored wealth instantly across borders for a marginal fee by simply memorizing a 16-word phrase. This is a profound human achievement: Humans can keep track of how much wealth they have accumulated in a peer-to-peer fashion, by using a simple program running on the internet. If the Bitcoin network reaches mass adoption, then one can think of the Bitcoin Blockchain as a causal graph which keeps track of how much energy each individual human has accumulated over time in relation to one another.

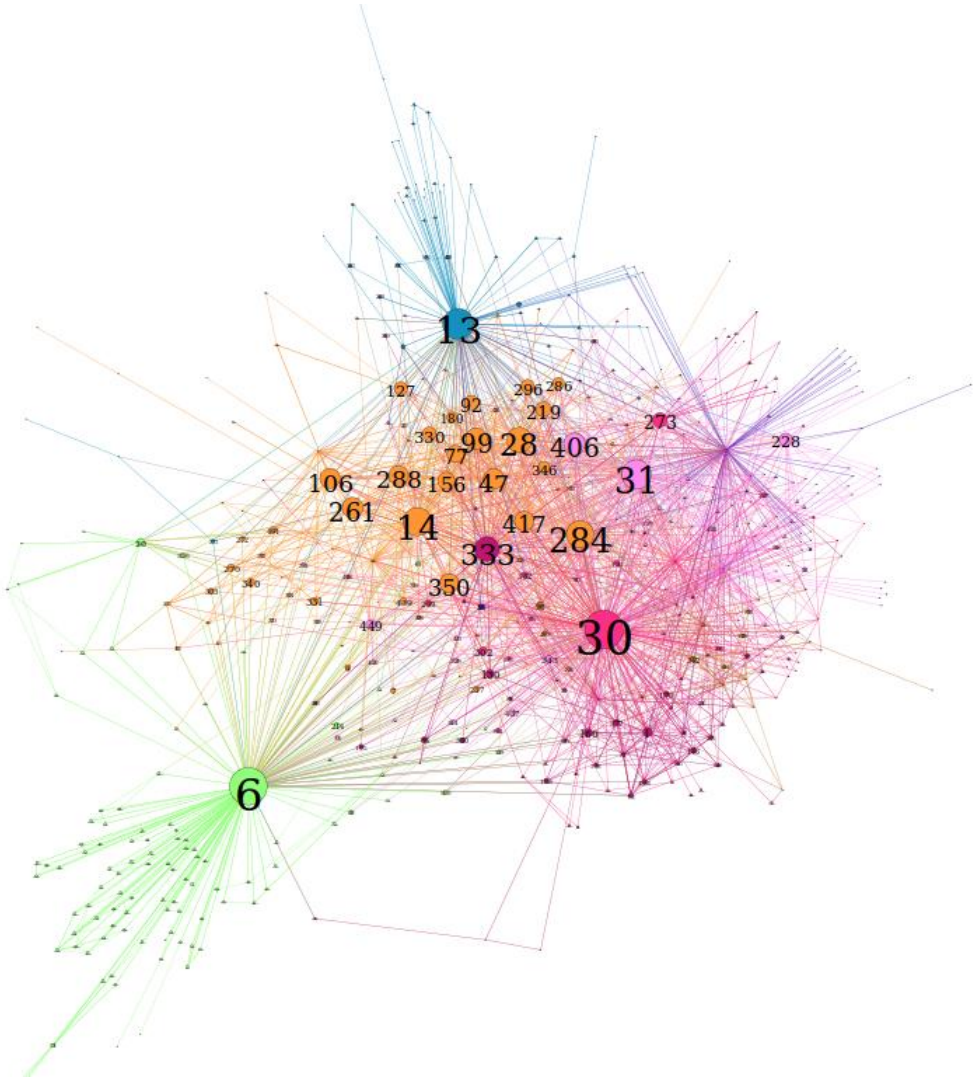


Figure 2 - Transactions among the first 500 users of Bitcoin [5].

Bitcoin has risen over 100 percent annualized versus the US dollar since inception, and for good reason. It provides deterministic guarantees on one's wealth. Your money isn't really your money, it is the property of the bank that holds it. Sure, you have FDIC guarantees up to $250,000 and the "confidence" that the Fed will print money if things get bad like in '08, but these are not effective solutions. The government could change the rules of the FDIC guarantees if they wanted to, as any system controlled by humans can and will be manipulated by humans. Even if they did guarantee your FDIC limit, money printing leads to monetary debasement which is ultimately detrimental to greater society. A typical CPI basket is up 22.4% cumulatively since January of 2020, and the median mortgage for first time home buyers is up from just over $1,000 to $2,300, the highest ever.

Figure 3 - US Aggregate Inflation rate per Truflation.

When a human jumps into an ocean from a boat, they know they will fall into the water due to the gravitational force exerted on their body from the Earth and then float in the water due to their body having a lower density than the salt water. When a human interacts with the Bitcoin blockchain, they will know deterministically how their wealth will be transferred or stored.

If you send 1 BTC from your wallet to a friend's, your percentage ownership of the total Bitcoin supply will decrease by one twenty-one millionth. If you purchase 10 BTC, you know that your percentage of the total Bitcoin supply will increase ten twenty-one millionths. When you sign the transaction with your private key, no human or group of humans can stop the transaction. It will execute faultlessly, one million out of one million times. Similarly, there is no human being capable of changing the supply schedule of the network because the monetary policy is deterministic. Unlike FDIC limits which are controlled by a small group of humans, it would require manipulation of thousands, and eventually millions of independent Bitcoin Miners with competing incentives to change the monetary policy of Bitcoin.

The deterministic nature of the Bitcoin network allows ones to store energy over time with no decay factor, unlike the Fed's 2% inflation target which would cause one to lose half of their wealth in 35 years. With your seed phrase memorized, it is the only form of wealth where nobody can steal it from you – physically or via monetary debasement. This is the power of Cryptographic Truth.

Money is but the first of an immeasurable number of applications of Cryptographic Truth. In Wolfram's Spacetime Causal Graph, the edges between nodes represent some type of computational rule that dictates how each node evolves over time. This is akin to a Smart Contract enabling the algorithmic movement of cryptographic assets based on pre-defined conditions.

When the economic relationship of two humans interacting with one another can be codified, then a smart contract can mathematically define that relationship within the bounds of a Turing complete coding language. Blockchains and Oracle Networks, such as Ethereum and Chainlink respectively, provide the infrastructure to create trust-minimized applications such as Decentralized Finance (DeFi), parametric insurance, and trade finance. DeFi is the recreation of financial primitives that power our economy, such as banking, securities trading, or derivatives, but with additional properties: These systems are tamperproof, deterministic, and permissionless.

This innovation is set to create massive efficiency gains in the traditional financial system. Previously illiquid assets will become tokenized, unlocking trillions of dollars of value which can now be used as collateral for new economic activity. Not only will the programmable nature of these assets allow for innovations that were previously impossible, but all tokenized assets will be able to interact with each other over a shared interoperability layer, and further composed into new and interesting financial products. Imagine a tokenized investment product created by a hedge fund which tracks their portfolio, enabling retail investors access to the tools that sophisticated investors use: Long and short exposure as well as complex option strategies. These strategies can be embedded in a single token whose value mirrors the fund's positions. Now, imagine a new product that aggregates one hundred tokenized hedge fund products together. Taking this even further, imagine a product that aggregates tokenized hedge funds, venture funds, private equity funds, real estate funds, and more. One can purchase a single token that not only aggregates these tokenized funds, but also uses an advanced AI/ML strategy to determine the optimal weightings between the products. The possibilities are endless with programmable tokens.

While this sounds like it could introduce large amounts of risk, systemic risk will be dramatically reduced in this new system. Programmable smart contracts reduce counterparty risk to zero because once one enters a contract, it will deterministically execute based on its pre-defined conditions. If any counterparty does not have the money to satisfy their obligations, they mechanically cannot enter the contract in the first place. Because blockchains are completely transparent, every participant can verify the reserves or collateral of every counterparty in the contract in real time[4]. A long chain of assets that are collateralized against each other will be algorithmically liquidated if bad collateral is detected. It doesn't matter if you are a penny-stock trading college student or the CEO of the largest bank in the world – every individual is subject to the same rules. Although blockchains force transparency, there is a way to maintain privacy. Zero Knowledge Proof technology (ZKP) enables the verification of information or computations without revealing the underlying data [6].

The freedom to transact in almost any way one wants will undoubtedly lead to overleveraging and blowups. These will be contained within single market participants who take on too much risk, though, and their collateral will be liquidated quickly and efficiently with zero threat to other market participants. Quite the contrary to 2008 where correlated, or in some cases, the same assets were significantly over levered and the participants at fault got bailed out.

Decentralized computing infrastructure is not only set to change developed markets but developing markets as well. There are only 2.2 billion people globally with access to financial services, but over 4.5

[4] Chainlink Proof of Reserves is the market leading decentralized infrastructure to verify reserves in real time

billion with smart phones. SpaceX now has more satellites in space than any Government and is on track to provide global internet with Starlink.

There will be an incredible amount of value creation in unbanked communities by giving individuals access to a digital system of private property rights, sound money, and ultimately the ability to control their economic destiny. Intelligent, hard-working people will be able to learn through internet resources, save their wealth, manage risk, and start business ventures. Their successes will lead to hires, wealth creation, and ultimately more investment into products and services in their local geographies. As these communities and businesses grow, they will be able to direct that wealth into social services and infrastructure. Education will improve rapidly, and this will create a positive feedback loop of global productivity growth.

There are 500 million farmers globally that do not live in a local geography that has a government which is stable enough to support a legal system. As such, they do have access to insurance. For a farmer in India, for instance, one or two bad seasons of crop yield could cause their business to fail and for them to have to become a migrant worker. The ability to access insurance from a smart phone with internet access will give millions of individuals the ability to mitigate this risk and to secure their work and future livelihood. Because these smart contract insurance products are hyper-reliable and effectively collateralized by end users (users must pay up front to receive insurance), a modern asset class will emerge where these insurance cashflows are securitized. This new asset class, called a Securitized Insurance Cashflow, will be superior to an asset backed security. As the developing and developed worlds merge, new financial products will be created and sold to a global marketplace where sophisticated investors are constantly seeking diversification and cash flow generating assets.

A global, internet-based financial system is being created that anybody can access, regardless of the country they are from, their "accredited investor status," or any other labels. This system is incorruptible by people and provides deterministic guarantees one one's wealth and economic relationships. New asset classes will be created, systemic risk will be reduced, and ultimately the ability for every individual on this planet to control their economic destiny will improve. Money is energy, and energy is life. A deterministic financial system will unlock human innovation and potential while minimizing corrupt human intervention which affects us all.

As we move into a world powered by Artificial Intelligence, Cryptographic Truth will power the increasing number of autonomous economic agents, allowing them to transact with each other. Trust-minimized information systems will also protect the masses from authoritarian governments. Eric Schmidt expects there to be massive disinformation campaigns leading up to the 2024 election [7]. As generative AI becomes more powerful and easily accessible, knowing what is true and not will be critical to maintaining a functioning society.

1.3 The Intersection of AI and Cryptographic Truth

With the rise of smart phones and the mobile web, it is clear the physical and digital realms are merging. AI and decentralized computing infrastructure will accelerate this trend. With the ability to create digital scarcity, decentralized computing infrastructure enables humans to create digital systems which mirror

the physical world. Blockchains and oracle networks convert atoms to bits, and permanently record the state of those bits over time in an immutable, tamperproof system.

This is to say the physical and the digital will ultimately become part of the same overarching abstraction co-existing on a common footing. As autonomous AI agents interact with humans, a shared substrate will be necessary for inherently non-trusting AI agents to conduct commerce with one another.

1.3.1 Decentralized Training of AI

As discussed in *The Age of AI,* Eric Schmidt believes we are moving towards a future where AGI[5] supercomputers manage and govern society [8]. Their capabilities will be so advanced that their actions will appear alien to humans. Similar to other tools, such as nuclear fission & fusion, they will have the potential to be used for great good or great evil. This will be entirely dependent on the data that humans use to train them.

Data is everything when it comes to training a neural network. The capabilities, as well as biases, are a direct result of the dataset used to train it. For this reason, the open-source training of large-scale neural networks is critical to ensure AI isn't used for evil.

Imagine a future where an AI system monitors various aspects of the economy and makes recommendations to policy makers, or even executes decisions on its own, on how to distribute resources to those who need it most. The goal of this AI would be to equitably distribute the tax income our government receives. If the data which triggers this AI is manipulated, then it could instead make decisions which transfers wealth from those who need it most to the elite class[6]. In this scenario, having decentralized oracle network with hundreds of nodes controlled by independent agents which transparently feed data into the AI would ensure that it is not manipulated by a small group of people. One can easily imagine politicians urging citizens to "trust the AI," and nobody being able to verify if the AI is acting in the best interest of society because it is literally impossible – neural networks are black boxes. Open training data will be critical to create a fair society.

To increase the effectiveness of these large-scale AI systems, ZKP technology can be implemented so that humans can privately share data that is used for AI training. This can ensure that we can create the most powerful and productive AIs possible, but still preserve human safety and privacy.

With respect to training hardware, the behemoth tech companies currently have a massive advantage over open-source solutions. There is some room for competition here, though. One example is a decentralized protocol where users "lend" their excess GPU capacity to a shared network, think Airbnb but for your graphics card. Because retail compute resources are not close to the cutting-edge chips used by companies such as Apple, Microsoft, Meta, and OpenAI, this type of network almost certainly can't train advanced models. These systems could be used for inference, though, which is the process of running live data through an already trained AI model to make a prediction. With further breakthroughs in

[5] Artificial General Intelligence: The point where an AI can self-recursively improve itself and is indistinguishable from human-level intelligence

[6] This is currently being done by manipulation of the CPI index to change taxes brackets, social security, and Medicare [9]

hardware and training, it is possible that these networks could one day be used for training adequately powerful models for some tasks, but ones which are still orders of magnitude away from the cutting-edge models.

Ultimately, decentralized computing infrastructure will help enable a future where the power of AI is not centralized with a few tech companies or the government.

1.3.2 A Shared Substrate for AI Interaction

Although the commercial use of AI is prevalent today, there are various limitations to its effectiveness. Almost all companies utilize some type of Enterprise Resource Planning (ERP) software, which effectively digitizes every aspect of a company such that the day-to-day business activities can be optimized using AI. Companies cannot link or share data between their respective ERP systems, though, which creates discontinuities in supply chains. Although a singular company can optimize their system with AI, naturally when two companies must interact there is friction due to the lack of connectivity between their systems. In the case of a company like Amazon, the first instances of physical robots are being utilized in parts of their supply chain. These robots, which move boxes around their storage warehouses, are the first step in cyber-physical systems automating supply chains. To move beyond the warehouse, these robots will one day need to interact with other robots. This is where potential discontinuities exist in the physical domain. To understand how these issues will be solved, it is important to know how cutting-edge AI systems operate. The most powerful form of AI currently in existence is an Artificial Neural Network. These are systems that must be trained on vast data sets. Once trained, a weighting set determines how a neural network responds to information.

The human body is the API for our consciousness to interact with the universe. An AI cannot directly interact with the universe, it must be fed data. Whether an AI is reliant on a host of various sensors – touch, sight, heat, etc. – ultimately these sensors convert some signal into 0s and 1s. As such, an AI's sensors are its API with the universe. A neural network takes in data and generates an output. It does not question the content or quality of that data. If a company deploys an AI to do certain tasks within the closed environment of that company, there is no reason for the data powering the AI to be in question. What if we are talking about two inherently untrusting AIs interacting with one another, though?

When two AIs interact that do not inherently trust one another, they must trust they are both operating with the same data, i.e. a shared reality. If they utilize sensors from different companies, how can they trust they are sensing the same thing? If they share sensors from a single for-profit company, how can they ensure the company has not been bribed and is conflict of interest free? Ultimately, if our economy is to be automated increasingly with the use of AI, the amount of value that can be transacted will be limited to the amount of trust that these AI will have between one another.

Decentralized computing infrastructure solves this problem by enabling the creation of digital conservation laws. Oracle networks, in particular, are the bridge between the physical world and the digital domain. Objective, trustless digital "environments" can be created that any number of arbitrary AI agents can exist in. An environment could be the shared world of tokens that trade on exchanges, or information regarding a specific supply chain. Tokens can represent *anything* that can be represented by

mathematics. This means that physical systems can be represented in the digital domain where scarcity is preserved, allowing inherently non-trusting actors to engage with one another.

Utilizing ZKPs, any number of companies can share confidential data from their ERP systems in a private manner. This will allow software-based AI agents from these various companies to conduct commerce with one another in an automated fashion, where every counterparty can verify they are acting on the same information.

With respect to cyber-physical AI systems which are interacting with one another or with humans, they can utilize sensors which are run in Trusted Execution Environments (TEEs). This will ensure that the data they upload to a shared blockchain through the use of an oracle network is not manipulated. When the sensor data from both AIs has been uploaded to the blockchain, a smart contract can check that both AIs are "seeing" the same thing. Only then will the smart contract execute and exchange tokens between the two parties.

Ultimately, decentralized computing infrastructure allows the extension of physical systems into the digital domain, where relevant conservation laws are maintained.

2 Investment Catalysts: Enterprise Adoption will Begin in 2024

2.1 Multiple BTC ETFs have been Approved

Crypto as an asset class reached over 3 trillion dollars in value during the peak of the previous market cycle, with Bitcoin peaking at 1.26 trillion. To put this in perspective, the aggregate market cap of the 44 companies that compose the Global X Robotics & Artificial Intelligence ETF (BOTZ)[7], one of the largest AI ETFs by holding size, is over 3 trillion, with Nvidia making up over half of that value. The crypto industry went from a niche sector to a legitimate industry in the past few years, and is now on the radar of the worlds largest financial institutions.

Whether it be Elizabeth Warren putting together an "anti-crypto army" [10], the quick constricting rules on Crypto activities for banks deemed Operation Chokepoint 2.0 [11], or the SEC Chariman Gary Gensler coming for the largest players in the crypto industry, it is clear the nascent technology has left the "First they ignore you" phase, and has entered the "And then they fight you" phase. If crypto was not a legit threat to the established incumbents, these actions would not have occurred. If our political leaders and regulators truly cared about consumer protection, they would be working with established US crypto instutions such as Coinbase, Gemini, and Circle to create safe, fair regulation that benefits consumers. Instead, the SEC has denied any attempt at thoughtful cooperation and has attacked US crypto companies.

Blackrock, the largest asset manager in the US, have been approved for a Bitcoin ETF using Coinbase as its custodian [12]. Has the plan been to move crypto off-shore, or has it been to slow down crypto native adoption to allow incumbents to catch up? George Soros believes the latter [13]. The fact that Coinbase is being sued by the SEC but is the choice custodian for Blackrock shows that this regulation is not an attempt to kill crypto. With Blackrock dispelling negative sentiment around the space, a flood of institutions have proposed new crypto businesses. For instance, a new crypto exchange backed by Citadel Securities, Fidelity, and Schwab recently began operations as well (the largest market maker in US, the 3rd largest asset manager in US, and the largest publically traded investment firm, respectively). The big boys have come to play.

[7] https://www.globalxetfs.com/funds/botz/

Firm	AUM, B	Activity	Build or Partner
BlackRock	9,090	Bitcoin spot ETF	Partner - Coinbase
Fidelity Investments	4,240	Bitcoin and Ether trading and custody, full stack crypto wealth management solutions	Build - Fidelity Digital Assets
JPMorgan Chase & Co.	3,300	Tokenized USD and EUR transfers via JPM Coin	Build – Onyx private blockchain platform
Morgan Stanley	3,131	Access to three bitcoin funds	Partner – Galaxy, NYDIG
Goldman Sachs	2,672	OTC crypto trading	Partner - Galaxy
BNY Mellon	1,910	Hold, transfer Bitcoin & Ether	Partner - Fireblocks
Invesco	1,484	Bitcoin ETF in Europe, filed for Bitcoin ETF in US	Partner – CoinShares, Galaxy
Bank of America	1,467	Bitcoin futures trading	Partner - CME Group
Total Assets	**27,294**		

Figure 4 - Bitcoin ETF Products.

Larry Fink has said he believes Bitcoin is “Digital Gold,” and that investing in it is a “flight to quality.” Although he is talking his book, I find it interesting in BlackRock’s support of Bitcoin during a time of expansive deficits and rising geopolitical tensions. I expect the effect of a Bitcoin ETF to be similar to that of a Gold ETF.

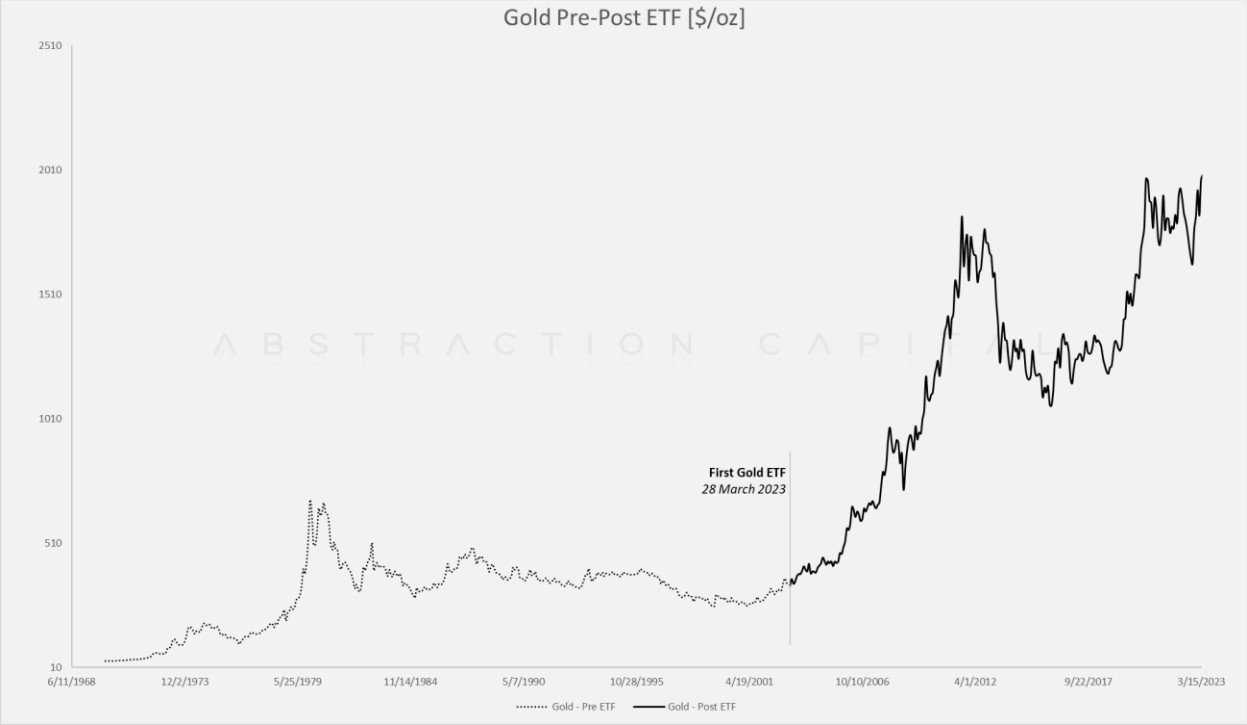


Figure 5 - The price of Gold, pre and post ETF.

Currently the approved Bitcoin ETFs are receiving around $500 million dollars a day of inflows, in what is one of the most successful ETF launches of all time [16]. There is currently 12.5x more demand for Bitcoin than what is being produced on a daily basis [14]. The percentage of Bitcoin holders that have held their BTC tokens for at least 155 days is at an all time high of 76% [15]. The conditions for a supply shock are in place – this will be further discussed in Section 3.1.

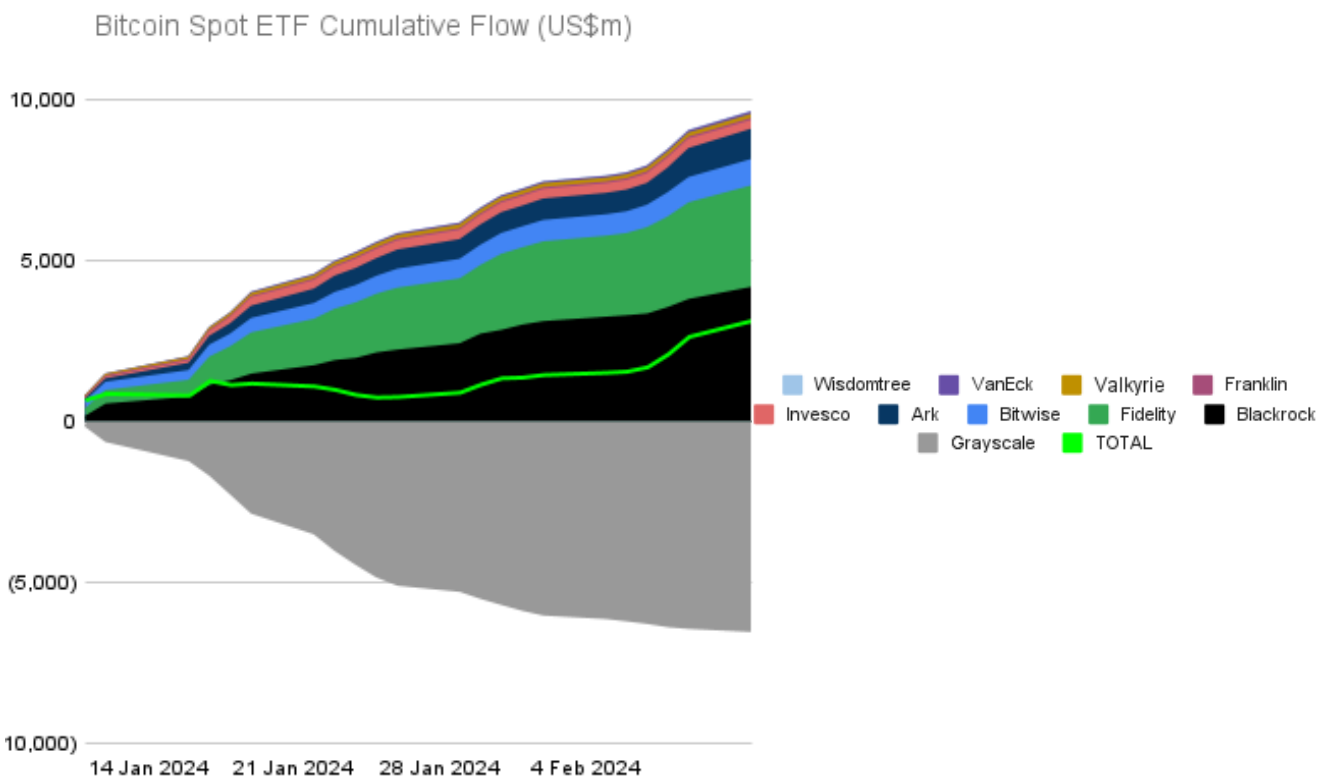


Figure 6 – Bitcoin Spot ETF Cumulative Flows.

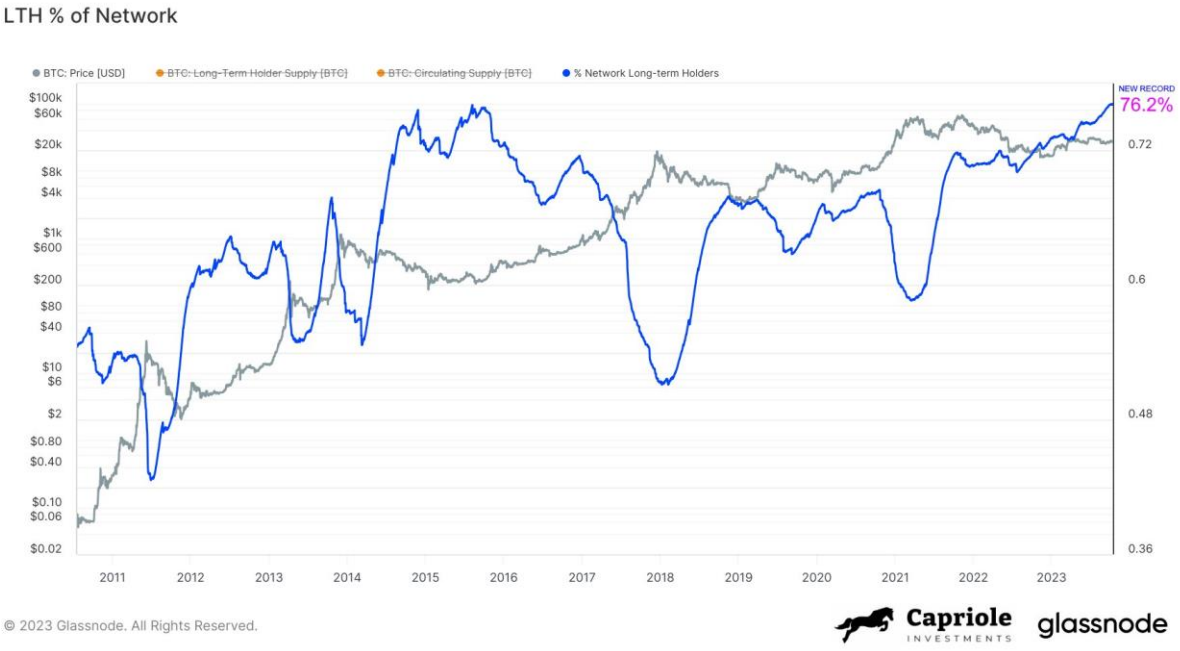


Figure 7 - Bitcoin Long Term Holder percentage of Network. A long term holder has held BTC for at least 155 days.

2.2 Moving Beyond ETFs: Tokenization of Real-World Assets (RWAs)

Blockchains can be thought of as truth machines that act as incorruptible, highly secure, and inexpensive third-party intermediaries. They reduce counterparty risk to effectively zero and remove high fees from rent seeking middleman. Yes, some business models in the current financial system will die from this technology, but the major players will not.

Not only are the world's largest financial institutions legitimizing the asset class through investment, but they are adopting the technology as well. The bedrock of the global financial system are the banks. They hold the assets that ultimately collateralize the rest of the financial system and enable the suite of products we are accustomed to. The worlds' largest banks are currently creating their own private blockchains to tokenize their assets. Per Victor O'Laughlin, Managing Director and Head of Tokenization of BNY Mellon,

"BNY Mellon was founded in 1784 by Alexander Hamilton, the first treasurer of the US…first stock traded on the stock exchange, first loan to the US government…we continue to stay relevant because we innovate and want to continue to stay engaged and grow. We service 20% of the world's investible assets, so that's twice the world's GDP in terms of custody. We clear and settle 10 trillion a day in US Government treasury securities, 2 trillion in payments, and we have wealth management and a strong distribution franchise, essentially services broker dealers and registered investment advisors. I am the head of the enterprise tokenization in the bank, so I have a view of what's happening across all different lines of business, and I see this interoperability play happening not only connecting banks and others to each other because historically what financial institutions haven't done well is connect. So, what's happened is we all have our own islands, and we all try to operate the best way we can but there is always some sort of fear or nervousness around what happens If we connect more broadly into the market, what happens to our market share, what happens to my business. It is a complicated question, and we see blockchains and chainlink and others not only connecting infrastructure to each other, market infrastructure like DTCC or SWFIT, but even within banks, you know because we have multiple systems, you have multiple lines of business and they have grown up independent of each other so there is a lot of integration that needs to happen within banks. So BNY Mellon is very much focused on building a centralized digital asset platform, connecting our individual lines of business in different rails we have, but also connecting more broadly to the likes of DTCC, SWIFT, and perhaps one day, Chainlink". [17]

McLaughlin notes that the current architecture of their accounting systems is so archaic that each branch of the Bank cannot interact with each other. Due to the Dodd-Frank Act, each branch must keep a significant amount of latent capital to ensure that if there is any financial contagion their systems will remain operational. This means there is a substantial amount of liquidity that the bank cannot profit from. Due to the incredibly slow wire times, any value that is being sent is effectively latent as well.

A Blockchain based system solves these problems because all assets can be tracked in real-time. Not only will this drastically reduce the amount of capital buffers, but due to atomic t+0 settlement, latent capital will be immediately available to recycle into productive use-cases. Previously illiquid assets can be tokenized as well. Per Bain & Company,

"Inefficient, illiquid markets with easy-to-authenticate assets, like private equity, private debt, and private real estate, probably have the most to gain from tokenization". [19]

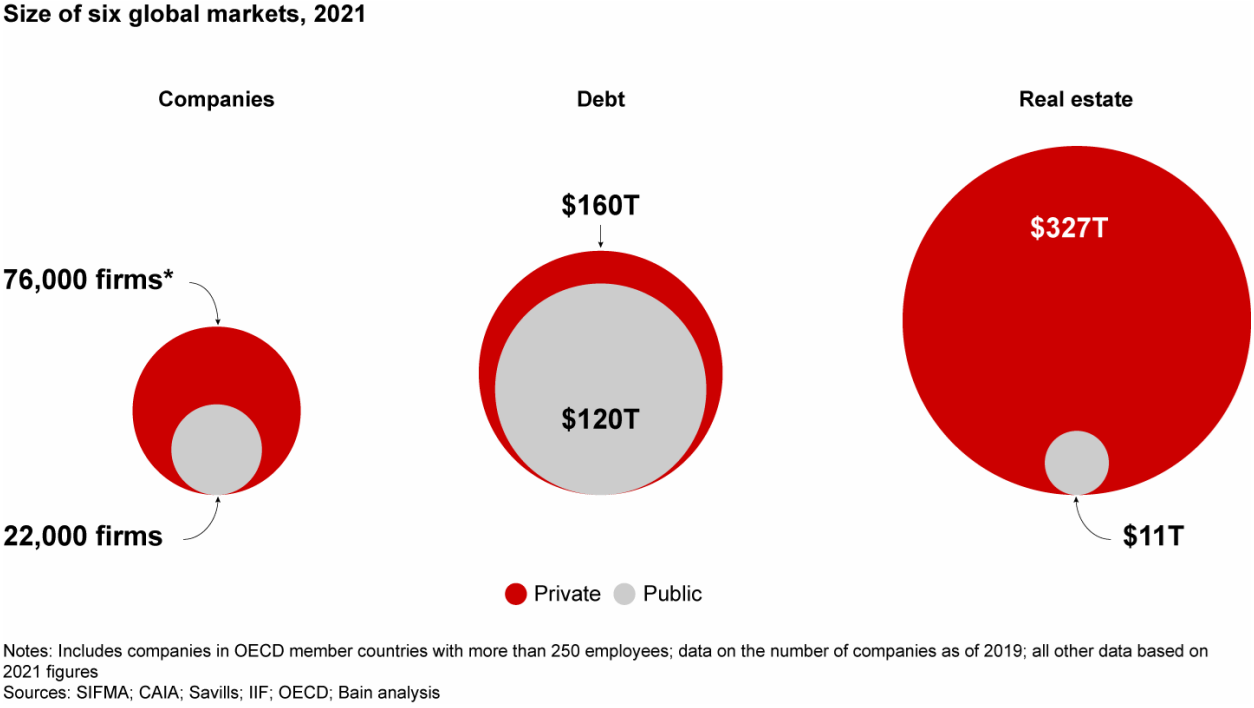


Figure 8 - Private vs. Public size of large global markets.

This is already occurring. ANZ, Australia's second largest bank by assets under management, has successfully completed an experiment where they tokenized Australian Carbon Credit Units (ACCUs). ANZ also was the first commercial bank to issue an AUD-reference stablecoin, referred to as A$DC [31].

Not only are banks set to adopt blockchain technology, but key central securities depositories (CSDs) and financial market infrastructures (FMIs) are as well. The Depository Trust and Clearing Corporation (DTCC) is the world's largest market infrastructure provider. Stephen Prosperi, Executive Director of Innovation Strategy and Digital Assets is leading the DTCC's efforts in bringing Capital Markets on-chain.

"A post trade market infrastructure provider, our core business is providing clearance and settlement services for US securities markets and post some pretty big numbers, last year we processed 2.4 quadrillion dollars' worth of securities. We often get asked if that is a real number, it is in fact a real number. It represents basically all broker-to-broker trades of equities, corporate debt, treasuries in the us markets. Naturally they are very focused on blockchain and the opportunity it can present in the industry where they sit." [17]

"It is increasingly clear that blockchain technology is likely here to stay, with 97% of institutional investors anticipating tokenization will evolve asset management processes and $100 trillion worth of assets in the U.S. that could someday move on-chain." [18]

The DTCC automates and standardizes the processing of financial transactions, mitigating risk, increasing transparency, enhancing performance, and driving efficiency for thousands of broker/dealers, custodian banks, and asset managers. Tokenization can streamline these various processes and drive efficiency.

Figure 9 – The benefits of tokenization, per the DTCC [18].

Ultimately, blockchain will enhance every aspect of the DTCCs current system. There is a problem, though. Per Prosperi:

"*Rather than embarking on a wholesale rebuild of existing capital markets infrastructure, financial institutions are increasingly collaborating with innovative Web3 technology platforms like Chainlink to explore how capabilities can be embedded into their existing systems where possible to accelerate the real-world impact of blockchain technology in the global financial system. Our exploration in this space started with our collaborative work with Chainlink as part of Swift's interoperability project."* [18]

In order for banks, CSDs, and FMIs to modernize their financial infrastructure, they need a way to connect to blockchain based systems. As opposed to rebuilding their entire existing infrastructure and training thousands of employees to use a new system which will have to connect to hundreds, if not thousands of different blockchains, these legacy institutions have decided to collaborate with SWIFT and Chainlink to accelerate the real-world impact of blockchain technology in the global financial system.

SWIFT is the messaging system that powers over 11,000 banks – more than 98% of all banks in the world. Processing more than 500 billion dollars per day, they are a collective that is managed by the largest banks in the world[8]. SWIFT has been collaborating with Chainlink since 2016, where their Cross Chain Interoperability Protocol (CCIP) will enable any SWIFT bank to interact with any other bank's permissioned chain, or with any public blockchain, without having to upgrade any of their existing infrastructure [20].

[8] Without access to SWIFT, one's assets are effectively inert. This is why Biden removed Russia's access to the SWIFT system at the beginning of the Russia-Ukraine conflict.

Chainlink and SWIFT have already demonstrated this through various pilot programs in collaboration with:

Australia and New Zealand Banking Group (ANZ) – 1.09 trillion AUM

BNP Paribas – 2.94 trillion AUM

BNY Mellon – 1.9 trillion AUM

Citi – 23 trillion AUM

Clearstream – 17.6 trillion AUM

Euroclear – 992 trillion in securities transactions/year

Lloyds Banking Group – 0.88 trillion AUM

SIX Digital Exchange (SDX) – SIX subsidiary, 1.53 trillion AUM

The Depository Trust & Clearing Corporation (DTCC) – 2.4 quadrillion in securities clearance and settlement/year

Every bank is going to create their own private blockchain to create new and interesting tokenized RWA products. As such, an interoperability standard is required for every bank to interact with one another, and for tokenized RWAs to move between various bank chains. The SWIFT messaging system is already integrated by nearly every bank in the world, so why not utilize the same messaging system as the foundation for the new one? CCIP will enable every TradFi market participant to interoperate, but also future proof every system such that they can interact with any and all blockchains. Ultimately, the private bank chain world and the public DeFi world will merge into a single internet of contracts. CCIP and other Chainlike services will enable applications to completely abstract away the complexities of the underlying infrastructure, such that end users won't even know what chain they are on, or in some cases that they are using blockchain technology.

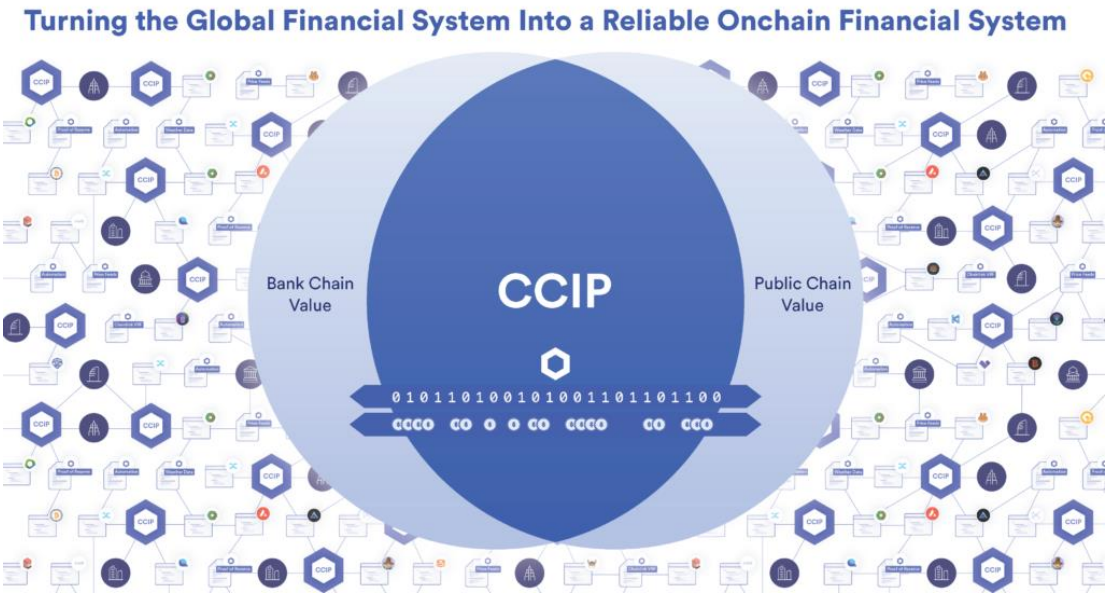


Figure 10 - A single internet of contracts powered by the global messaging standard, CCIP.

3 Macro and Crypto Market Cycle Tailwinds

To understand the investment environment ahead, it is important to have a lay of the land with respect to where we are in the cycles that matter. While early signs of enterprise adoption demonstrate the global financial system has recognized the fundamental value of cryptographic assets, cyclical tailwinds will further support growth of the asset class.

3.1 The Liquidity Cycle

Markets have fundamentally changed since the Fed's QE1 program post 2008. Macroeconomics no longer predict stock market movements – the reverse is true. Asset markets are leading indicators, they discount the future. As such, asset market performance predicts the economy. Michael Howell of CrossBoarder Capital has written extensively on this thesis [21]. In a world where the tail is wagging the dog, so to say, liquidity becomes the driving feature to factor into macro-economic models. This is because asset markets lead the economy and asset prices are highly sensitive to liquidity conditions.

CrossBoarder capital has a proprietary method for calculating global liquidity. They have been tracking data since 1970 and in the year 2000 created a method to predict future changes in the liquidity cycle. The sine wave seen on the chart below was calculated using a dataset from 1970 to 2000, where they fit the sinewave to their Global Liquidity Index (GLI) using Fourier analysis. They have run this model consistently without alteration for almost 25 years. The CrossBoarder Capital GLI currently predicts we are in a liquidity cycle upturn.

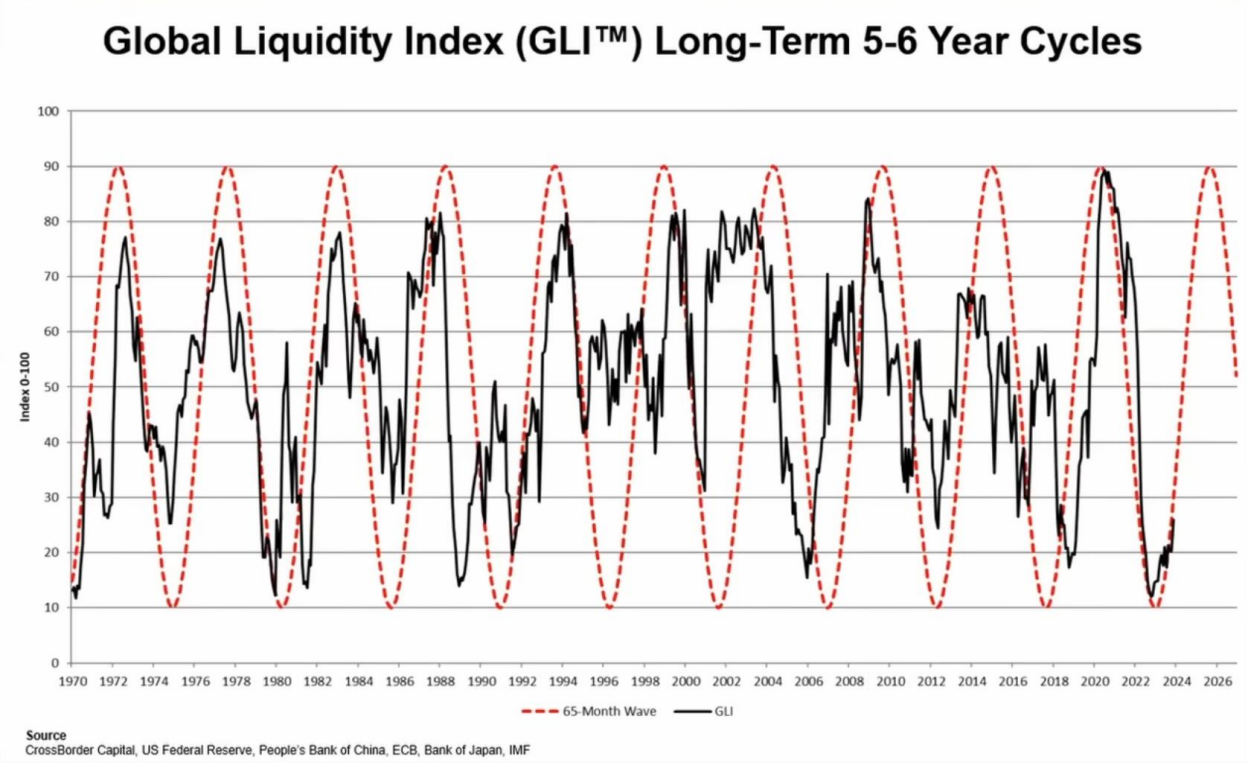


Figure 11 - CrossBoarder Capital GLI.

We must look at other factors affecting net liquidity to understand the investing environment of the next 24 months. With Biden and Trump the overwhelming favorites to win in 2024, it seems the old world will continue clinging to power until they literally no longer can. With Yellen's recent Quarterly Refunding Announcement (QRA) undershooting to the downside, if she was playing Chess for the Democrats it appears she is setting up the US for stimulus heading into 2024 [22]. Biden's approval rating is in the tank, after all [23]. With Japan [24] and China [25] stimulating as well, three out of the four major economies appear to be in the upswing of the liquidity cycle, which is historically bullish for risk assets. The year over year change in Bitcoin's price is highly correlated with Global Liquidity[9]. Crypto is the most sensitive sector to liquidity changes, and its rise in 2023 despite "recession fears" is further proof liquidity is king.

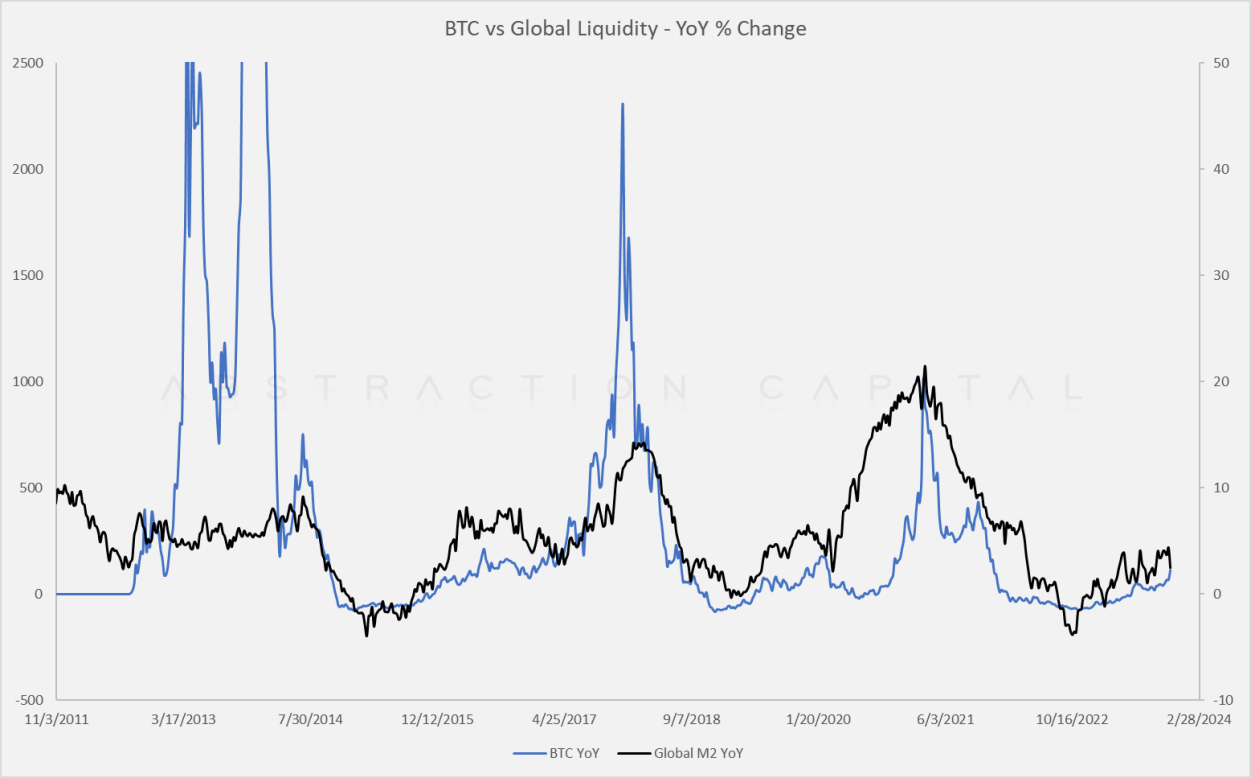


Figure 12 - BTC vs Global Liquidity. Y-axis for Bitcoin is scaled to display correlation. 2013 era BTC extreme price movements extend beyond displayed y-axis.

Macro is unpredictable, but the Fed's reaction function is not. With inflation cooling and their balance sheet contracting, they are giving themselves room to operate if a short-term economic crisis exposes itself. With a hot economy and bullish stock market, the sequence of events which would eventually lead to a rise in unemployment has reset again with Yellen's' November 1st QRA announcement. If something were to happen, just as the Fed created the Bank Term Funding Program (BTFP) to support SVB, I believe they have more bullets in the chamber to respond. With Powell clinging to his job after the epic blunder of running stimulus too long during the Corona Virus pandemic, he must do his employers bidding. After

[9] M2 of US, Euro, Japan, and China minus RRP + TGA

staying strong with his hawkish stance all year, he finally capitulated on December 13th [26]. The rate hiking cycle appears to be over, setting up a positive investing environment for risk assets which could continue through the end of 2025.

3.2 The Crypto Cycle

The crypto native cycle is almost perfectly aligned with this outlook, whether by pure luck or by design per the genius of Satoshi Nakamoto. The crypto cycle is approximately four years in length, which tracks the Bitcoin Halving. The aim of Satoshi Nakamoto with Bitcoin was to create a decentralized and perfectly scarce currency. As entities "mine" bitcoin – i.e. validate transactions and secure the network – they are rewarded with Bitcoin. This mechanism incentivizes rational economic actors to provide network services in exchange for payment. This payment, called the block reward, is emitted every 10 minutes. For the first 4 years of the network's life, the block reward was 50 Bitcoin. For Bitcoin to approach a finite value of coins, Satoshi programmed the block reward to halve every 4 years, such that the total number of coins asymptotically approaches exactly 21 million by the year 2140.

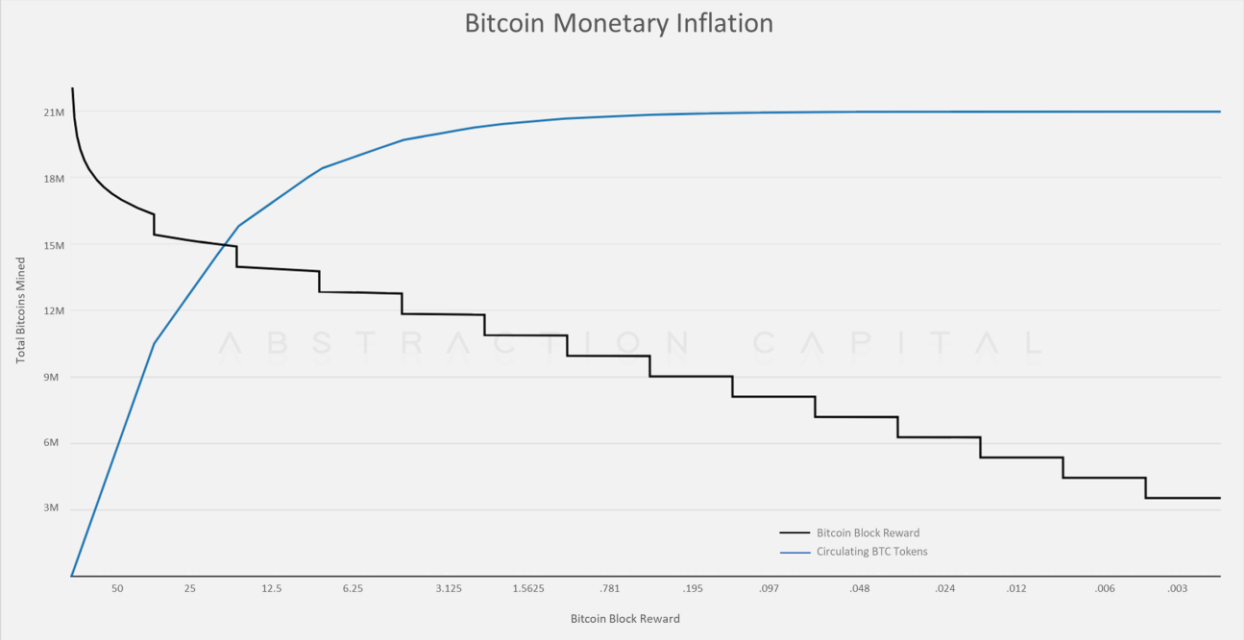


Figure 13 - Bitcoin Supply Schedule.

Miners need to sell their block reward to pay for the hardware and electricity to run their operation. When the block reward halves, their revenue drops by a factor of two overnight. The most efficient miners prepare for this moment by preserving capital, and typically after halvings are unwilling to sell their Bitcoins. On the other end of the spectrum, miners who are just barely profitable pre-halving, who must sell all their coins just to keep the lights on, turn off post halving. When their revenue cuts in half, their Bitcoin production cost is greater than the cost of a Bitcoin. As miners represent the largest sellers of Bitcoin, when these flows stop, Bitcoin experiences a sell-side liquidity crisis. The 365 days after the Halving present the best risk-reward opportunity to long Bitcoin historically. The rate of change of supply growth gets compressed and declines by more than 4% a month. Bitcoin is like oil on crack – production

is entirely inelastic, but demand is reflexive. As a result, price begins to rapidly appreciate when miner selling stops. As price increases, market reflexivity leads to even higher prices [27]. Higher prices lead to a stronger narrative which further supports even higher prices. A self-fulfilling prophecy fuels a bubble.

Historically, after the block reward halving the Bitcoin price peaks 12-18 months later. After the first 4 halvings, the price peaked 39662%, 9221%, 2980%, and 697% from the price on the day of the halving, respectively.

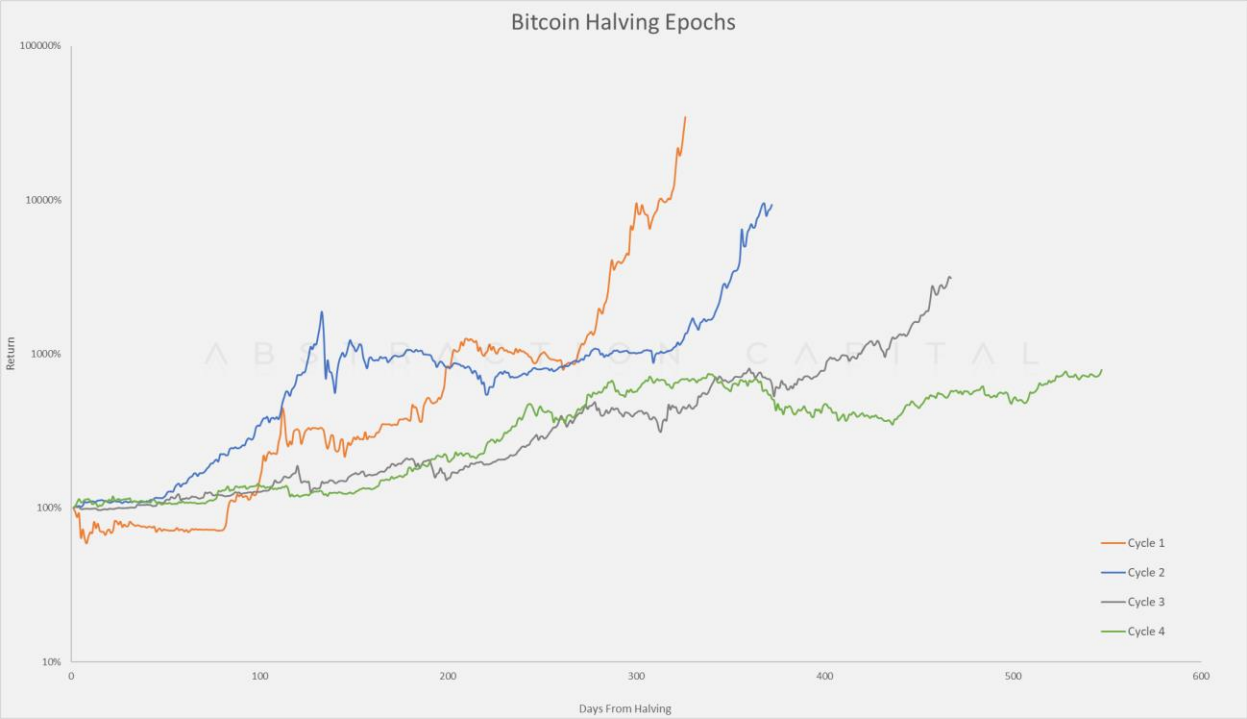


Figure 14 - Comparison of each Bitcoin cycle from halving to cycle peak.

We are approaching the halving in a few months, which is estimated to occur on April 20th, 2024. The past is never indicative of the future, but we know for certain the halving will occur. One assumption I am making is that this will trigger a 5th market cycle. Even with a 10% chance of another cycle occurring, the asymmetric return profile of crypto renders the risk worth taking. Crypto is growing at a rate faster than the internet. Even if growth slows significantly, the adoption rate is hard to bet against.

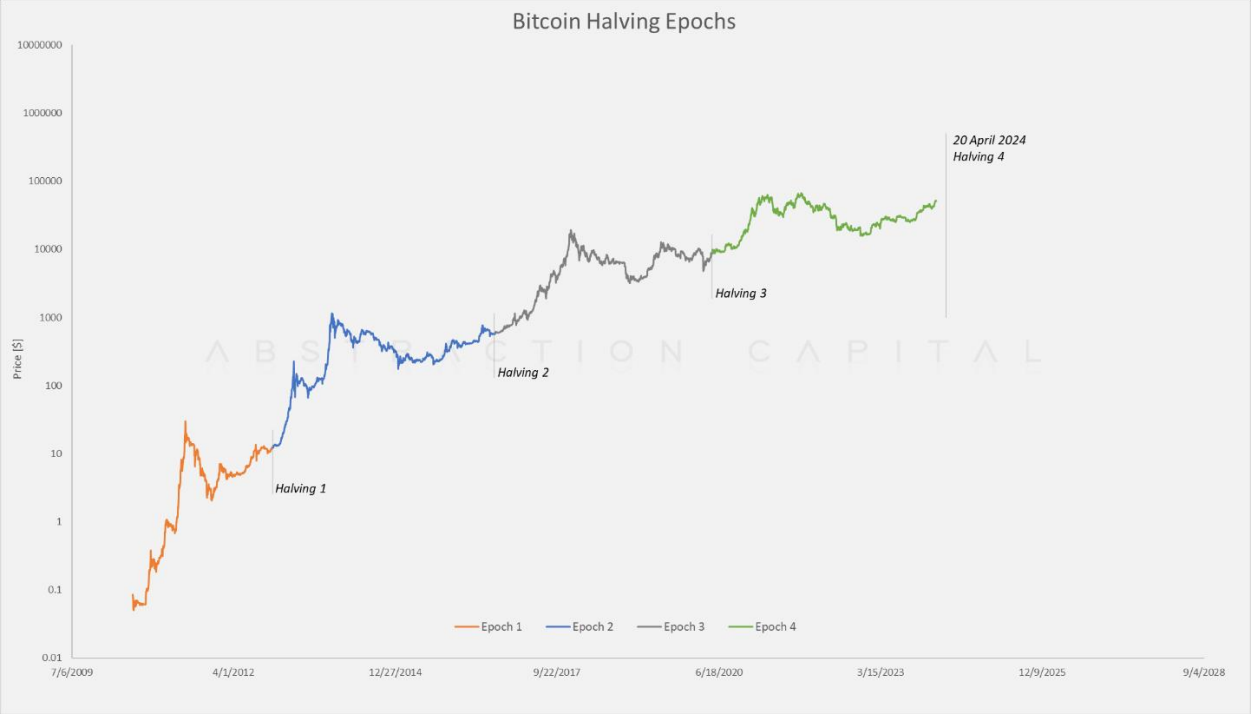


Figure 15 - Full price history of Bitcoin, with each cycle color coded.

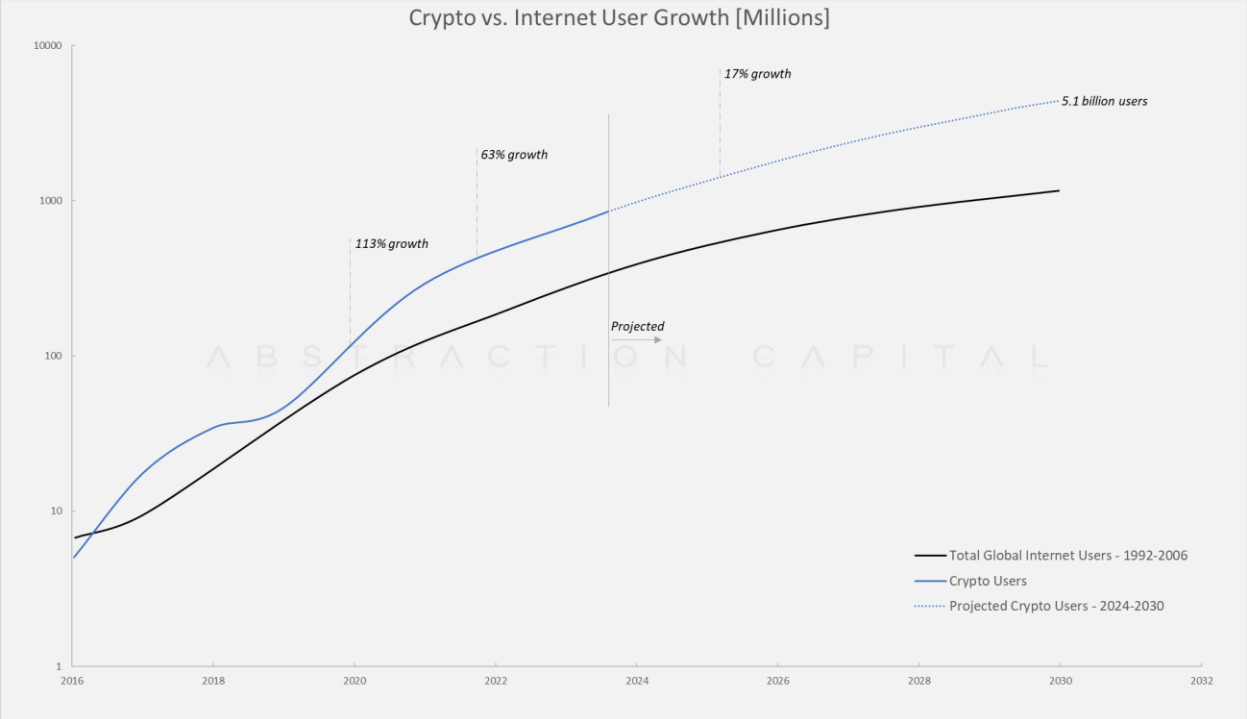


Figure 16 - Crypto Adoption Rate.

3.3 The Long-Term Debt Cycle

Whereas short-term cycles are noisy, the implications of long-term cycles are foreseeable so long as one has studied the events of the past and is patient enough to wait for them to repeat. The relevant long-term cycle is what Ray Dalio would describe as the "Long-term Debt Cycle," or what Neil Howe and the late William Strauss term the "The Saeculum" – the generational cycle that follows the length of a long human life. These cycles are one of the same – they both last 75-80 years, are defined by great international and internal power conflicts, and ultimately result in a new world.

Dalio would point towards WWII as the previous time in history that he saw this level of debt growth and money printing, wealth inequality, as well as a similarly great power conflict as the current one between the US and China [29]. Howe and Strauss would point to the end of WWII and the rise of the Baby Boomers as the previous "4th Turning," a crisis period usually defined by a great war which results in a new world order [30]. We are currently at the end of a large debt cycle, a "4th Turning," that Howe believes will conclude around 2033. Unfortunately, these long-term cycles do not shift until something bad has already occurred. This is human nature; we simply do not have the foresight to change our path at scale until it is too late. I do not know what it will be this time, or when, but I am confident that this level of debt, inflation, and societal disarray will lead to some form of financial reset over the next decade. I am willing to bet that this time will in fact not be different than every other generational cycle in history. Human nature, after all, is the one constant in this equation.

The future is unpredictable, we can only assign probabilities to what will happen next. In one future, 2008 was the peak crisis moment, and the rest of the decade will be challenging, but not overwhelming. In another future, WW3 breaks out this decade and makes 2008 look like a walk on a summer day. Ignoring these outcomes for now, I believe the one thing that has an extremely high probability of occurring is a financial reset marked by technological trends and further debasement of the US Dollar.

Whereas hundreds of billions, to low single digit trillions of government stimulus was provided after 2008, the Covid Crisis alone consisted of more than 13 trillion in government stimulus and quantitative easing. Economic volatility is undoubtably going to accelerate as we approach the end of this cycle. With each crisis the Treasury and Fed will respond with increasing amounts of stimulus, leading to increasing levels of inflation.

There are only three ways the US Government can solve its debt problem:

1. Increase taxes
2. Default on the debt
3. Financial repression

Increasing taxes is political suicide, and I can confidently say there is near 0% chance that Biden or Trump will go that route. No empire in history has chosen this path. It is also proven that taxes reduce economic activity and output, so that would only make the problem worse in the long run.

A country the size of the US cannot default on the debt. The results would be catastrophic, which is why every time it comes up both parties agree to raise the debt ceiling.

The only politically palatable way to solve the debt problem is through financial repression. Throughout history this has been the path that every empire has chosen. The goal is to inflate the debt away by indirectly borrowing from the private sector to pay off debts. As the currency is debased, the absolute value of the debt remains the same while its percentage versus the total amount of currency decreases. This solution can work if productivity growth increases to offset the debasement. The problem with monetary debasement is that it increases wealth inequality, which leads to populism.

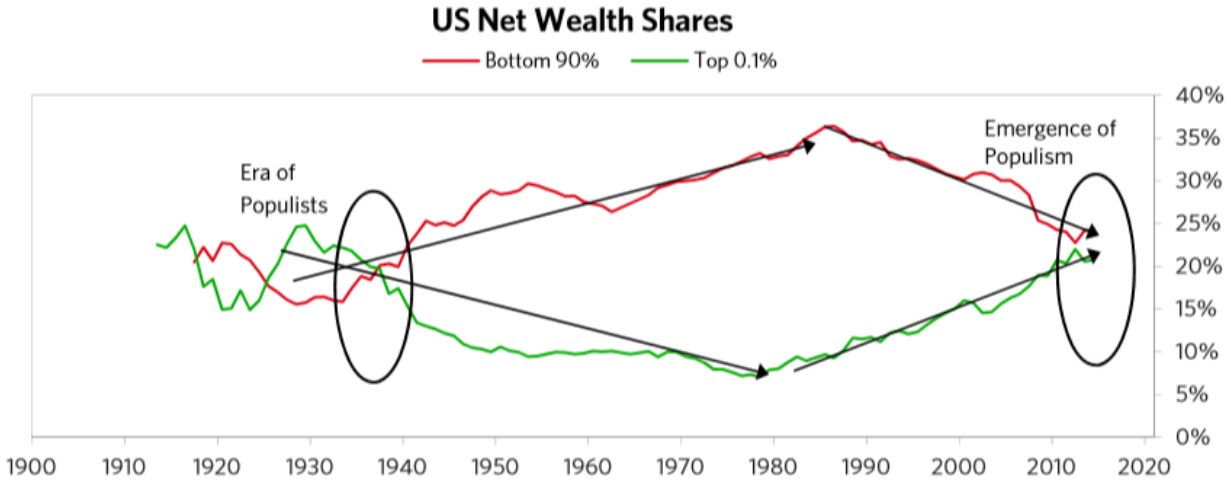


Figure 17 - US Wealth inequality can be highlighted by the decrease in wealth of the bottom 90% and the increase of wealth in the top 0.1% [32].

Populist politicians promise the masses helicopter money to get elected. As there is no incentive for any politician to address the debt, this leads to a self-reinforcing vicious cycle which ultimately ends with extreme levels of monetary debasement. An increase in global geopolitical conflict is also indicative that we are living through a 4th turning. As countries posture to gain an advantage position in a new multi-polar world order, this will lead to a rise in energy costs, de-globalization, as well as supply chain disruptions which will further bolster inflation.

This likely concludes with a deflationary recession unless a productivity miracle involving AI and blockchain occurs first. I personally believe a deflationary recession will occur within the next 10 years, remaining consistent with Howe's framework. This event is what will ultimately awaken the masses and cause a mass migration to decentralized financial infrastructure, likely spurring the largest wealth redistribution event of our lifetimes.

In conclusion, all signs point towards financial repression, which is hyper bullish for store-of-value assets such as Gold, Real Estate, Tech Stocks, and specifically crypto. I believe there will be a crypto bubble within the next 20 months, and a global adoption cycle which will occur over the next 10 years.

4 Investing Strategy

4.1 Market Structure

Analyzing the crypto market from a time-cycle perspective around Bitcoin's Block Reward Halvings yields a way to normalize each cycle and potentially gain insights into the future. Historically, Bitcoin has led each cycle out of the bear market. As the primary bearer asset of crypto investors, the performance of every other asset is measured off Bitcoin. Once Bitcoin recovers and shows strength, Ethereum and Altcoins tend to follow. As a result, I believe investing in altcoins is a profitable strategy, so long as one manages their risk.

4.1.1 Cycle 2 Correlation and Return Analysis

The following is an analysis on the crypto market from Halving 2 to the cycle peak, with respect to correlations between Bitcoin and the rest of the market as well as respective returns.

Halving 2 to Cycle Peak Dates

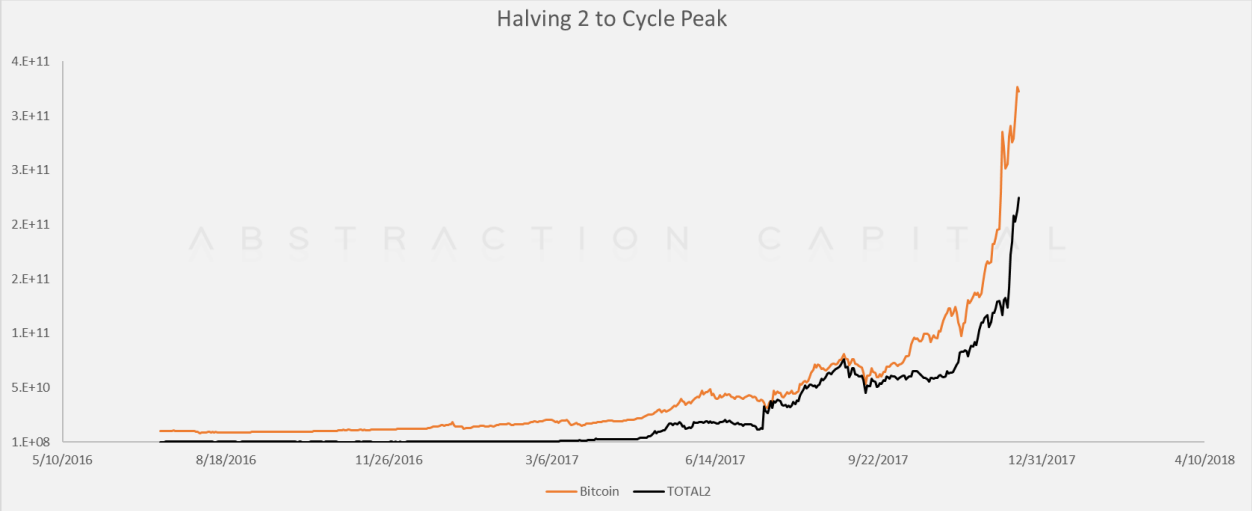
7/9/2016 - 12/17/2017

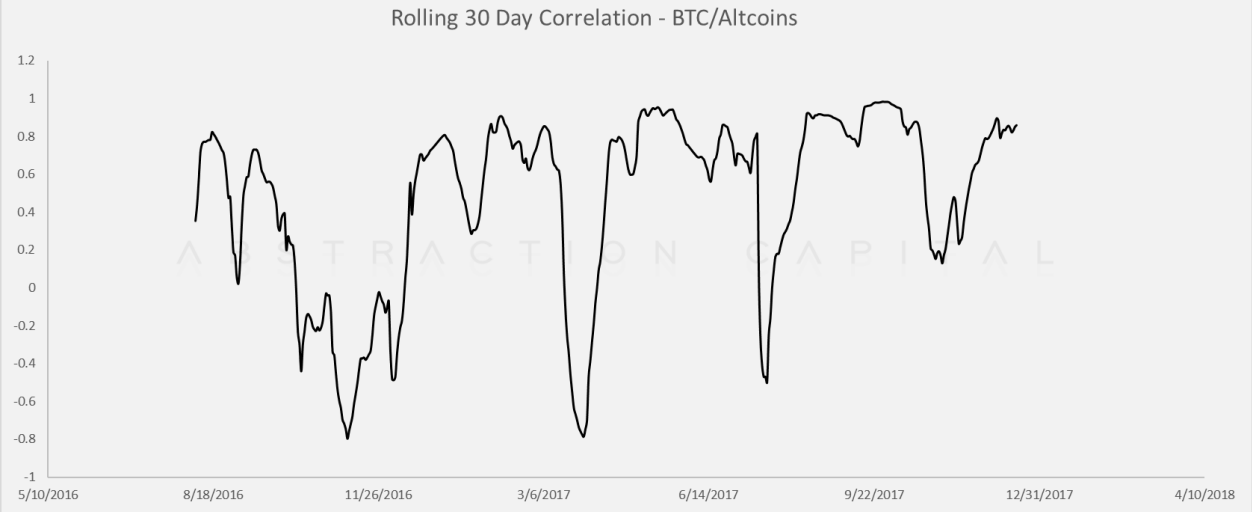
Correlation Data

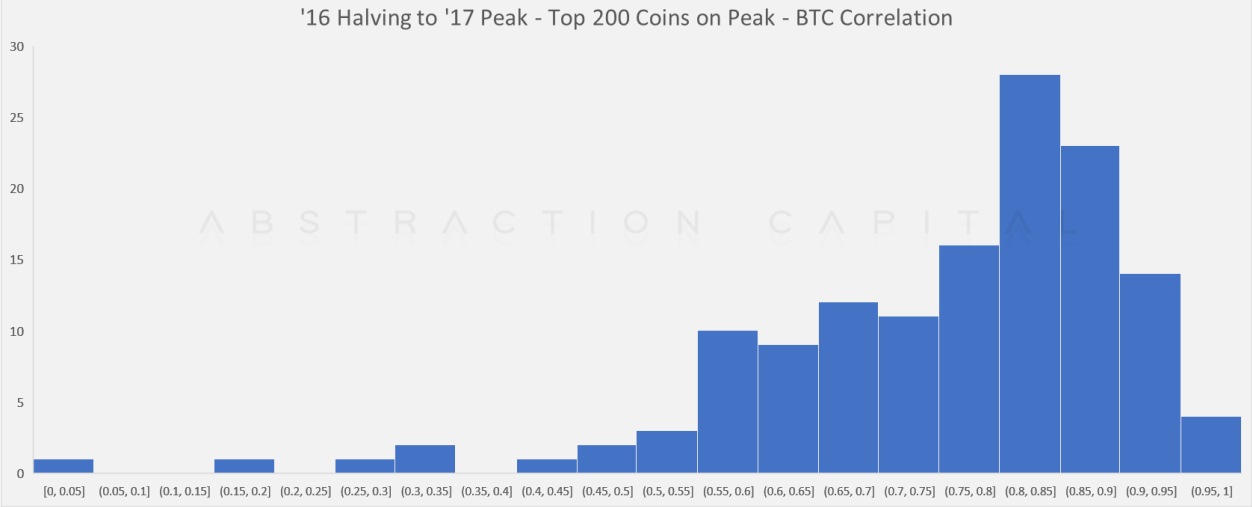
- The total correlation between Bitcoin and TOTAL2 (total crypto market capitalization excluding Bitcoin) was 96.45%.
- The median rolling 30-day correlation was 67.16%.
- The average and median correlation of the top 200 coins to Bitcoin was 72.16% and 77.16% respectively.

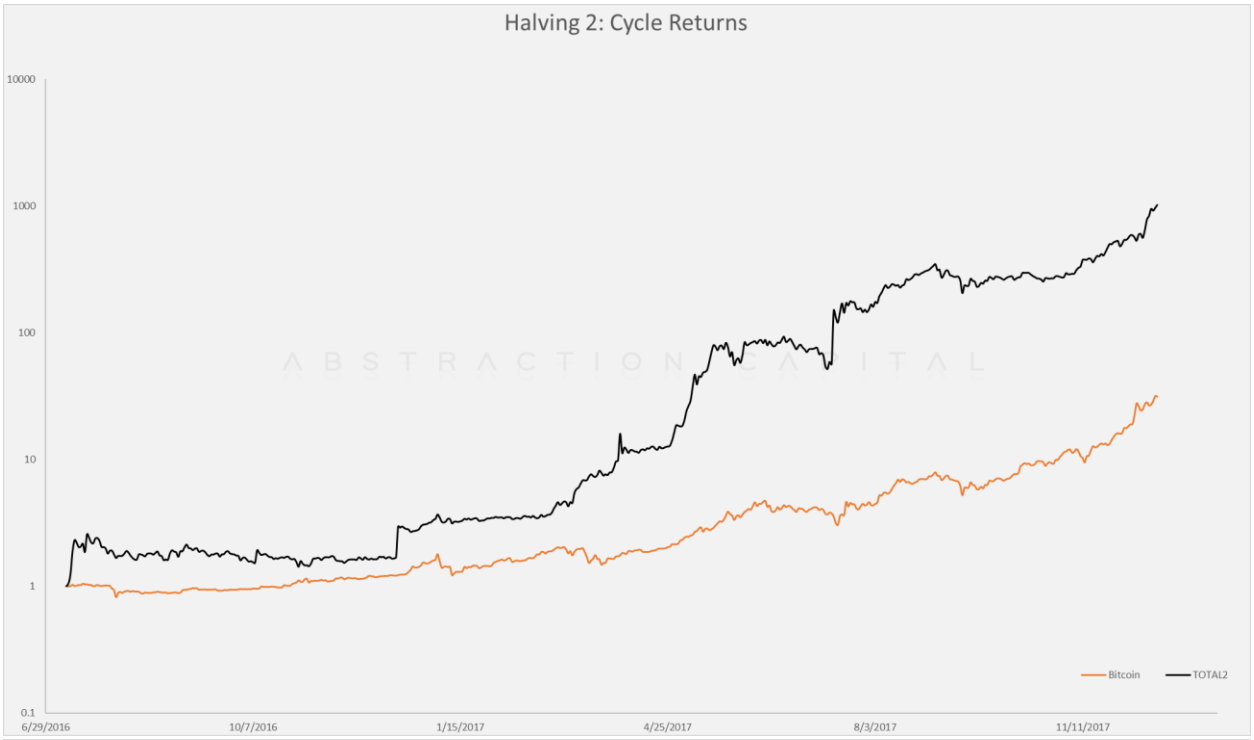
Return Data

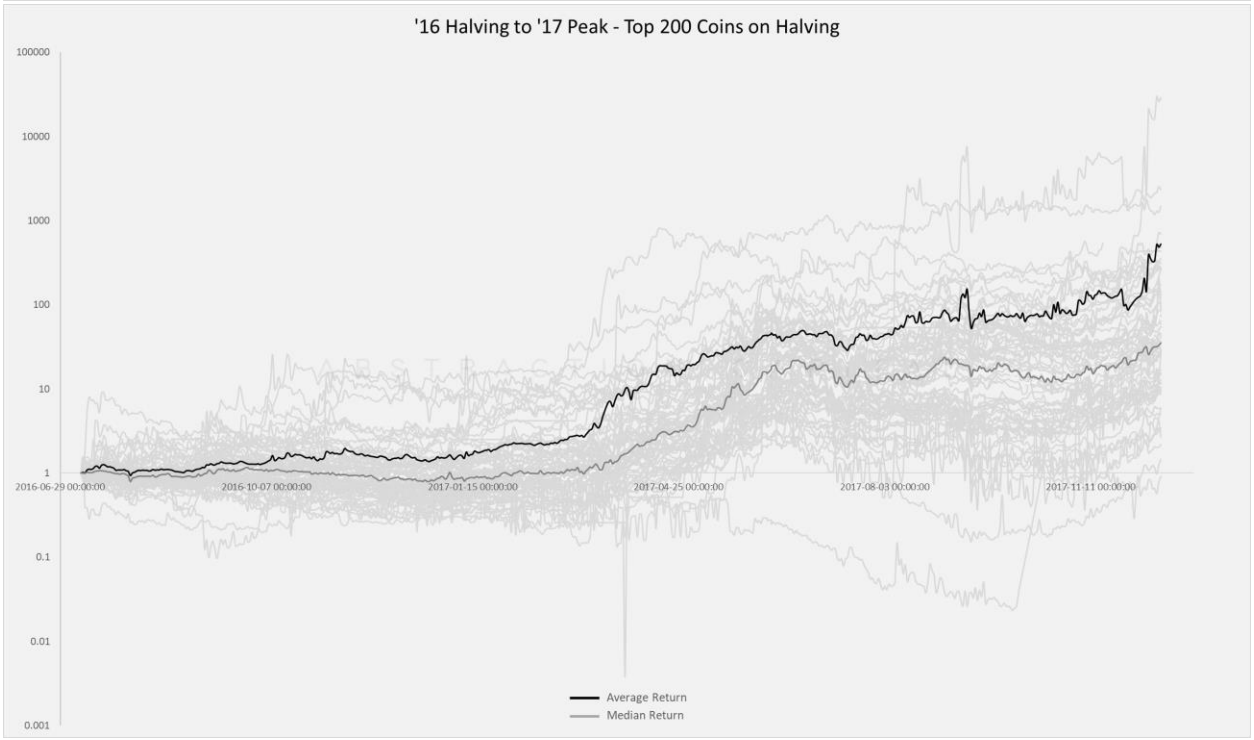
- The return of Bitcoin was 3176%.
- The max drawdown of Bitcoin from the Halving was 18.21%.
- The return of TOTAL2 was 102097%.
- The max drawdown of TOTAL2 from the Halving was 0%.
- The average return of the Top 200 coins was 526400%.
- The median return of the Top 200 coins was 3520%.
- 34.5% of tokens went to 0% and were discontinued.


Halving 2 to Cycle Peak
4.E+11
3.E+11
3.E+11
2.E+11
2.E+11
1.E+11
5.E+10
1.E+08
5/10/2016
8/18/2016
11/26/2016
3/6/2017
6/14/2017
9/22/2017
12/31/2017
4/10/2018
Bitcoin
TOTAL2


Rolling 30 Day Correlation - BTC/Altcoins
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
5/10/2016
8/18/2016
11/26/2016
3/6/2017
6/14/2017
9/22/2017
12/31/2017
4/10/2018


'16 Halving to '17 Peak - Top 200 Coins on Peak - BTC Correlation
30
25
20
15
10
5
0
[0, 0.05]
(0.05, 0.1]
(0.1, 0.15]
(0.15, 0.2]
(0.2, 0.25]
(0.25, 0.3]
(0.3, 0.35]
(0.35, 0.4]
(0.4, 0.45]
(0.45, 0.5]
(0.5, 0.55]
(0.55, 0.6]
(0.6, 0.65]
(0.65, 0.7]
(0.7, 0.75]
(0.75, 0.8]
(0.8, 0.85]
(0.85, 0.9]
(0.9, 0.95]
(0.95, 1]


Halving 2: Cycle Returns
10000
1000
100
10
1
0.1
6/29/2016
10/7/2016
1/15/2017
4/25/2017
8/3/2017
11/11/2017
Bitcoin
TOTAL2


'16 Halving to '17 Peak - Top 200 Coins on Halving
100000
10000
1000
100
10
1
0.1
0.01
0.001
2016-06-29 00:00:00
2016-10-07 00:00:00
2017-01-15 00:00:00
2017-04-25 00:00:00
2017-08-03 00:00:00
2017-11-11 00:00:00
Average Return
Median Return

4.1.2 Cycle 3 Correlation and Return Analysis

The following is an analysis on the crypto market from Halving 3 to the cycle peak, with respect to correlations between Bitcoin and the rest of the market as well as respective returns.

Halving 3 to Cycle Peak Dates

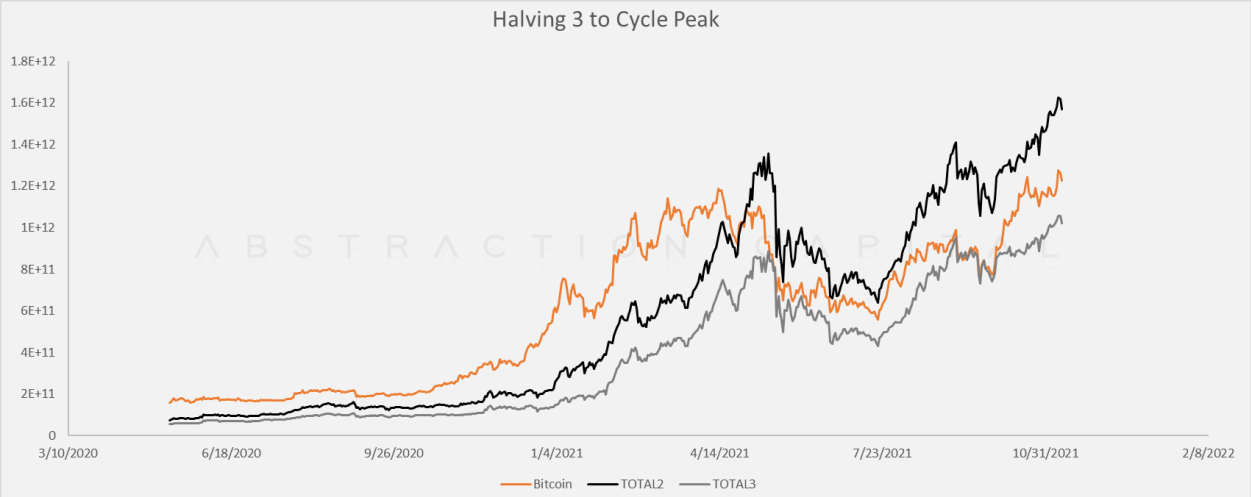
5/11/2020 – 11/10/2021

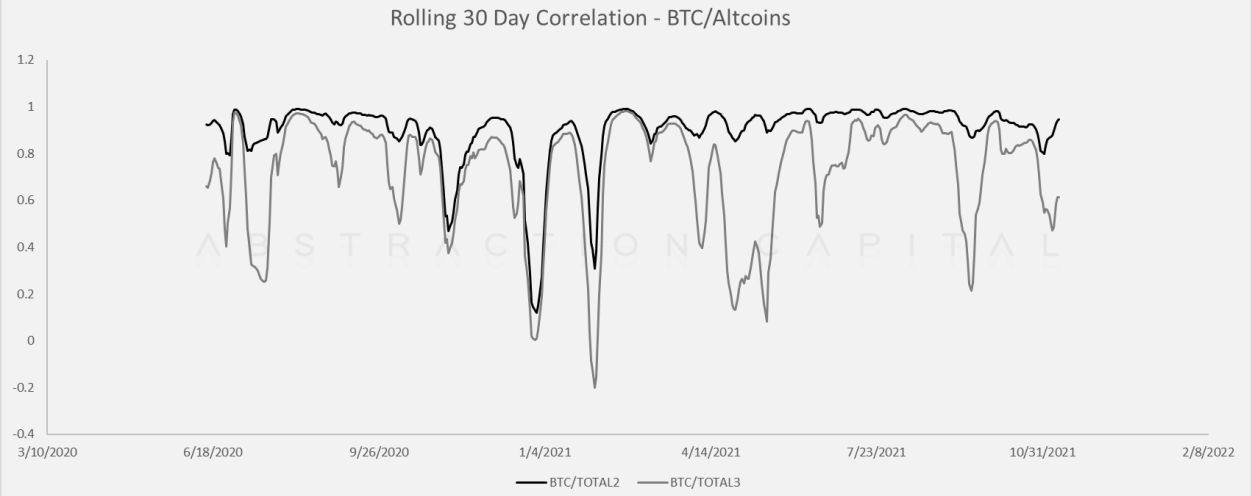
Correlation Data

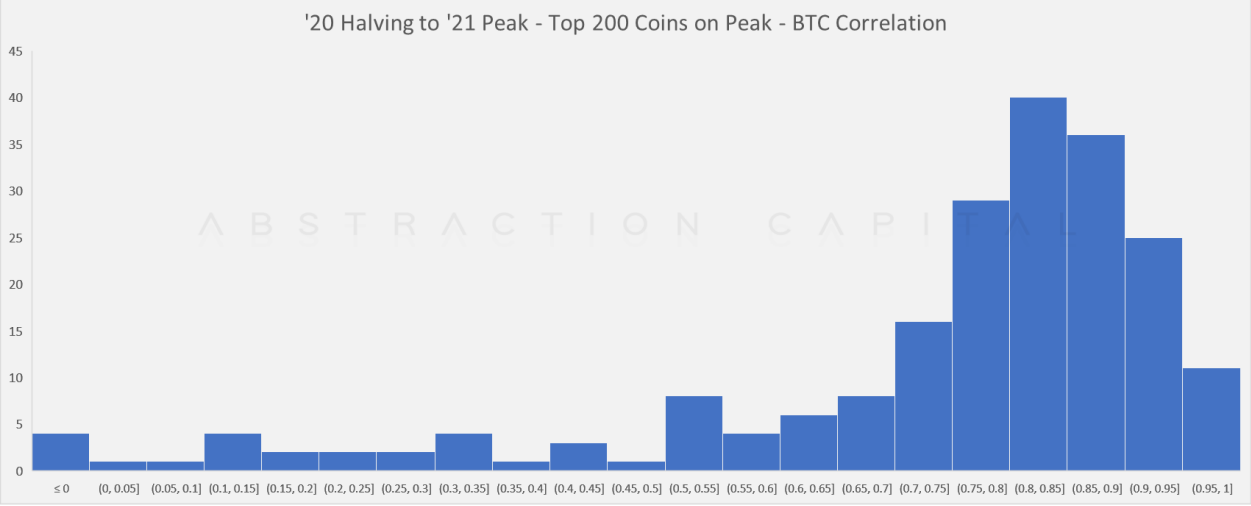
- The total correlation between Bitcoin and TOTAL2 was 88.04%.
- The median rolling 30-day correlation was 93.57%.
- The total correlation between Bitcoin and TOTAL3 (the total crypto market capitalization excluding Bitcoin and Ethereum) was 87.66%.
- The median rolling 30-day correlation was 81.43%.
- The average and median correlation of the top 200 coins to Bitcoin was 68.70% and 79.97% respectively.

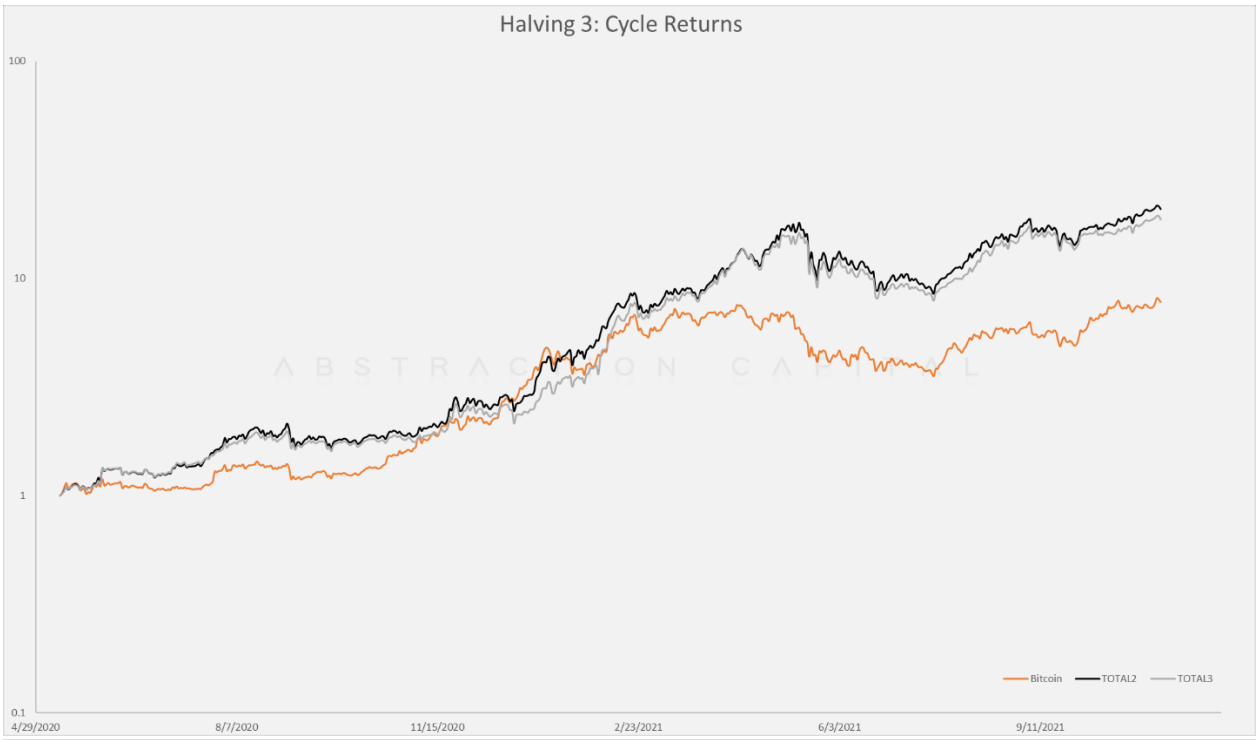
Return Data

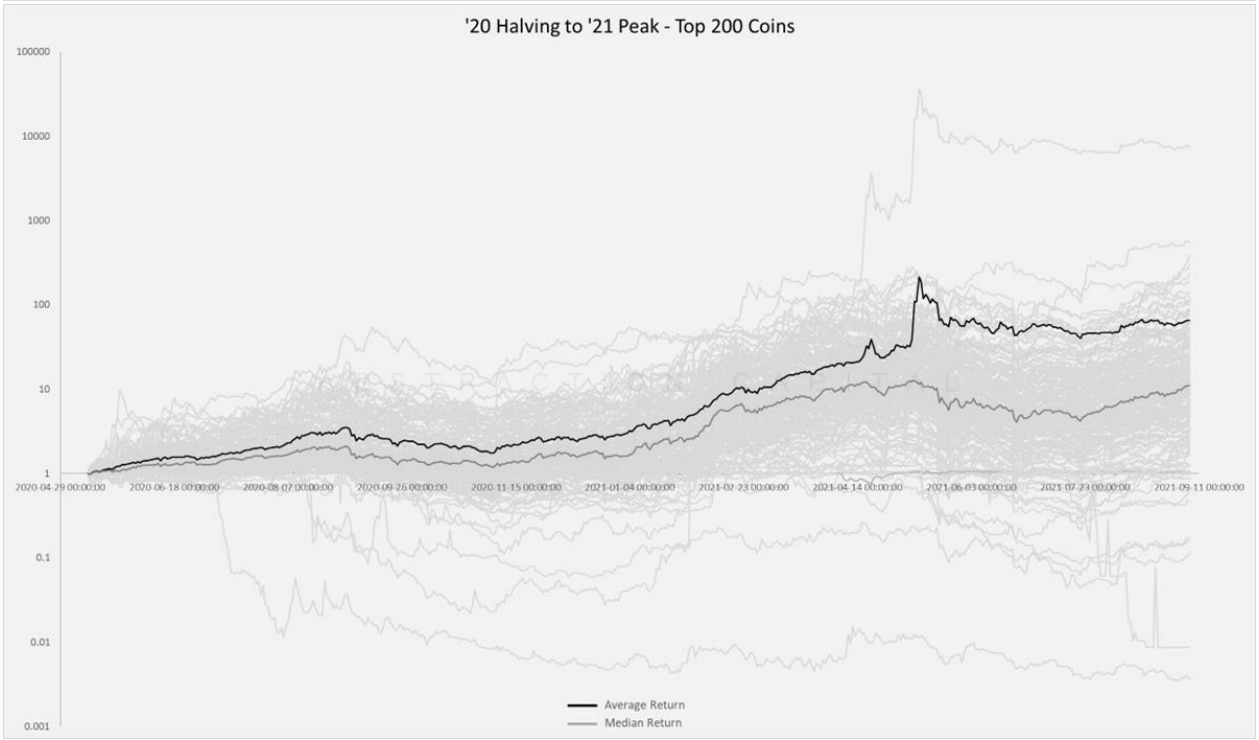
- The return of Bitcoin was 809.2%.
- The max drawdown of Bitcoin from the Halving was 0%.
- The return of TOTAL2 was 2158%.
- The max drawdown of TOTAL2from the Halving was 0%.
- The return of TOTAL3 was 1932%.
- The max drawdown of TOTAL3 from the Halving was 0%.
- The average return of the Top 200 coins was 6490%.
- The median return of the Top 200 coins was 1100%.
- 9.5% of tokens went to 0% and were discontinued.


Halving 3 to Cycle Peak
1.8E+12
1.6E+12
1.4E+12
1.2E+12
1E+12
8E+11
6E+11
4E+11
2E+11
0
3/10/2020
6/18/2020
9/26/2020
1/4/2021
4/14/2021
7/23/2021
10/31/2021
2/8/2022
Bitcoin
TOTAL2
TOTAL3


Rolling 30 Day Correlation - BTC/Altcoins
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
3/10/2020
6/18/2020
9/26/2020
1/4/2021
4/14/2021
7/23/2021
10/31/2021
2/8/2022
BTC/TOTAL2
BTC/TOTAL3


'20 Halving to '21 Peak - Top 200 Coins on Peak - BTC Correlation
45
40
35
30
25
20
15
10
5
0
≤ 0
(0, 0.05]
(0.05, 0.1]
(0.1, 0.15]
(0.15, 0.2]
(0.2, 0.25]
(0.25, 0.3]
(0.3, 0.35]
(0.35, 0.4]
(0.4, 0.45]
(0.45, 0.5]
(0.5, 0.55]
(0.55, 0.6]
(0.6, 0.65]
(0.65, 0.7]
(0.7, 0.75]
(0.75, 0.8]
(0.8, 0.85]
(0.85, 0.9]
(0.9, 0.95]
(0.95, 1]


Halving 3: Cycle Returns
100
10
1
0.1
4/29/2020
8/7/2020
11/15/2020
2/23/2021
6/3/2021
9/11/2021
Bitcoin
TOTAL2
TOTAL3


'20 Halving to '21 Peak - Top 200 Coins
100000
10000
1000
100
10
1
0.1
0.01
0.001
2020-04-29 00:00:00
2020-06-18 00:00:00
2020-08-07 00:00:00
2020-09-26 00:00:00
2020-11-15 00:00:00
2021-01-04 00:00:00
2021-02-23 00:00:00
2021-04-14 00:00:00
2021-06-03 00:00:00
2021-07-23 00:00:00
2021-09-11 00:00:00
Average Return
Median Return

4.2 Risk Management

One can leverage the historical correlations between Bitcoin and altcoins to generate alpha. An understated but important aspect of the crypto market is that Bitcoin almost always leads market wide price movements. As a result, predicting the directional component of the Bitcoin price is sufficient to manage altcoin risk. Abstraction Capital leverages a proprietary risk management algorithm derived from key Bitcoin metrics to enter and exit the market. Since inception, the algorithm has outperformed buy and hold by over 7035%.

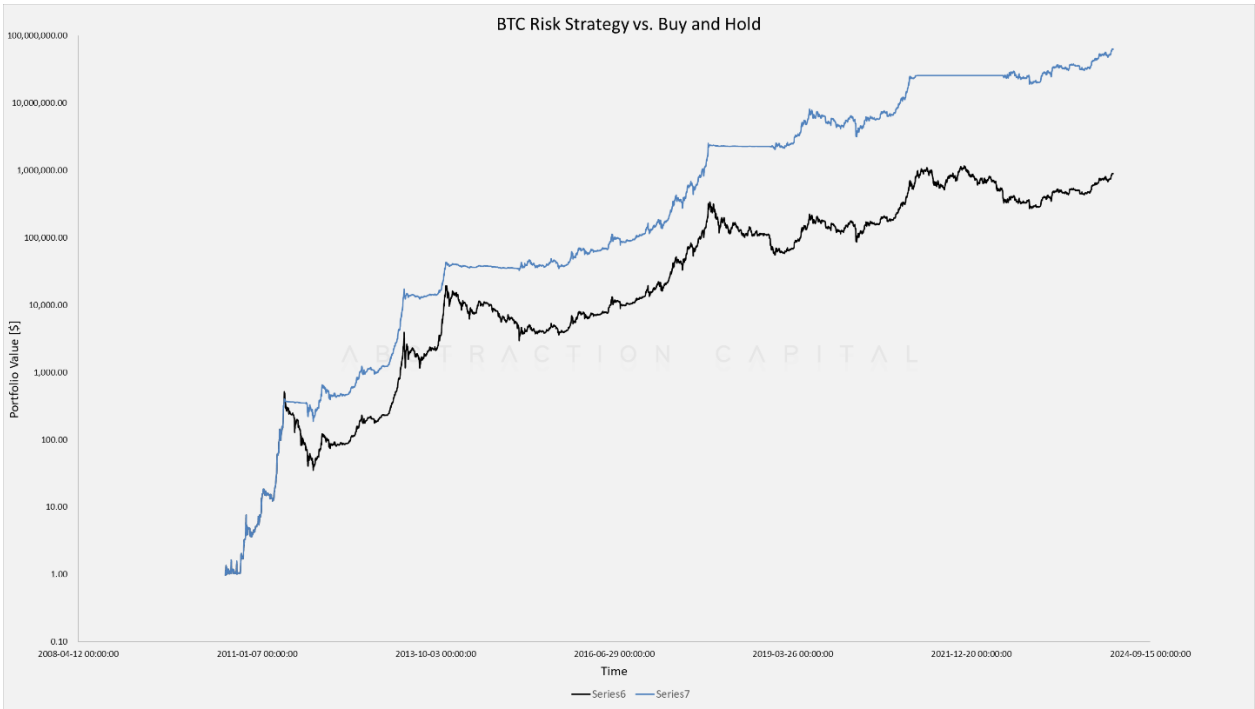


Figure 18 - Bitcoin Risk Strategy returns vs. Buy and Hold.

The risk algorithm exits within 35% of the topping price, on average. Although not perfect, timing tops is difficult when you are euphoric from exponential price movements. Having an algorithmic method to exit the market is a must to control your emotions. Abstraction Capital leverages shorter-term momentum strategies to manage altcoin risk, as well.

4.3 Portfolio Allocation

We are at the end of the long-term debt cycle, the 4th turning, and economic volatility is going to continue to accelerate. With each crisis the Treasury and Fed will respond with increasing amounts of stimulus, ultimately leading to higher levels of monetary debasement. The question to ask is the following: Where is the best place to put one's money to capture short-term rising liquidity conditions, as well as gain protection from accelerating monetary debasement over the next decade?

If one measures the stock market in terms of gold as opposed to dollars[10], one can see that productivity growth has come in waves. Adjusted for inflation, the stock market is down significantly from the all-time high marked by the .com bubble. This makes sense because US productivity growth has stalled to around 1.6% since the 1970s, other than a small period of 3% growth in the late-1990s to early 2000s marked by the 3rd Industrial Revolution.

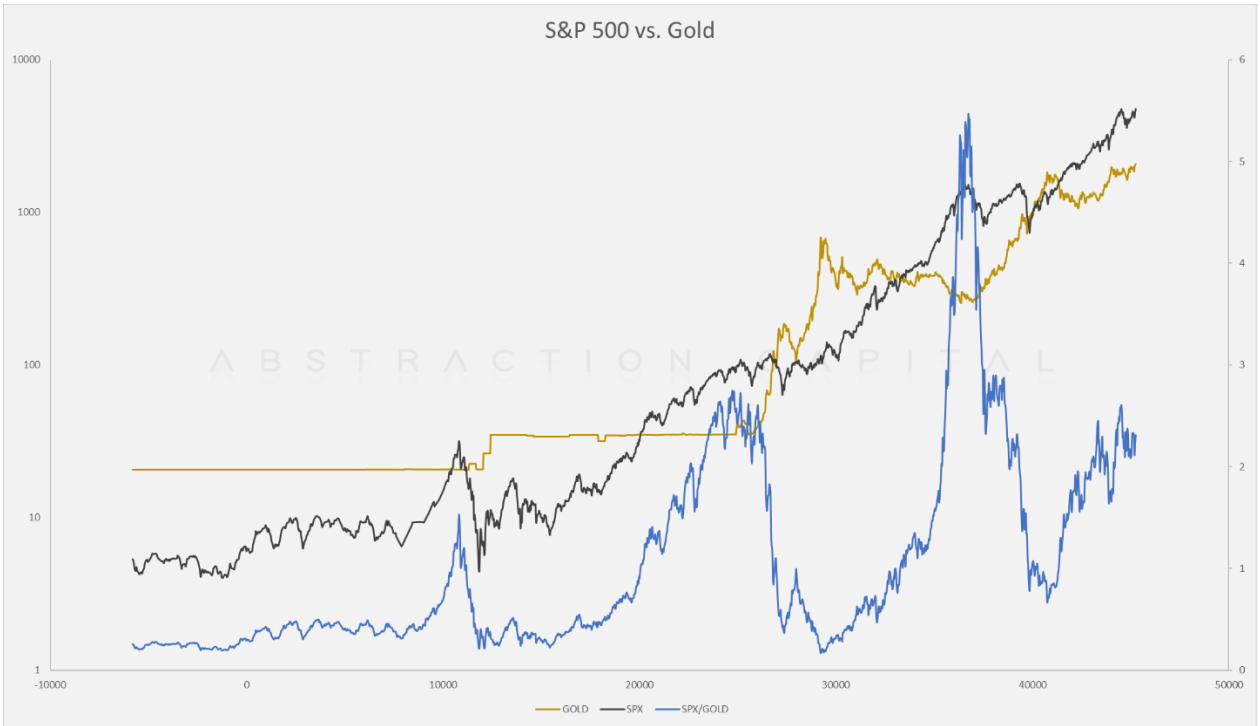


Figure 19 - Gold and S&P 500 in dollars plotted against the ratio of the two.

Although the stock market is currently making all-time highs, this does not necessarily mean your inflation adjusted buying power is increasing. CPI is a generalized cost-of-living framework which attempts to measure the *average* consumption basket. The problem with a generalized CPI metric is that every consumer has different preferences. Over 60% of workers in the US don't have $500 in savings [33]. Not to mention only around 50% of people have money invested in the stock market, and out of those people 10% own more than 90% of the market. When the stock market goes up, the majority of people experience no wealth effect.

Recalling the First Law of Thermodynamics, energy cannot be created or destroyed. When money is printed, the amount of energy that each human has accumulated must necessarily change such that the sum is constant. Inflation represents a wealth transfer from those that do not hold assets to those that do. The Cantillon Effect explains this phenomenon – it states that when monetary expansion occurs, the ones who profit from it are the ones who are "closest" to the money printer. Banks, big companies, politicians, etc. get to use that money first. When this class of the population receives money, it does not

[10] The USD has devalued more than 98% since 1913, the year the Federal Reserve Bank was created

change their spending habits for the items within the generalized CPI basket. Whether you are worth 10 thousand or 10 billion, you can only buy so much bread, toilet paper, or gas.

What we learned since 2008 is that quantitative easing is extremely bullish for stocks because excess capital is invested into the stock market. What we also learned from 2008 to 2020 was that sending money to rich people doesn't inflate generalized CPI any more than the FED's 2% a year target. If you look at the average consumption basket of a high net worth individual, though, things like health care, college tuition, and luxury goods have increased significantly more than CPI.

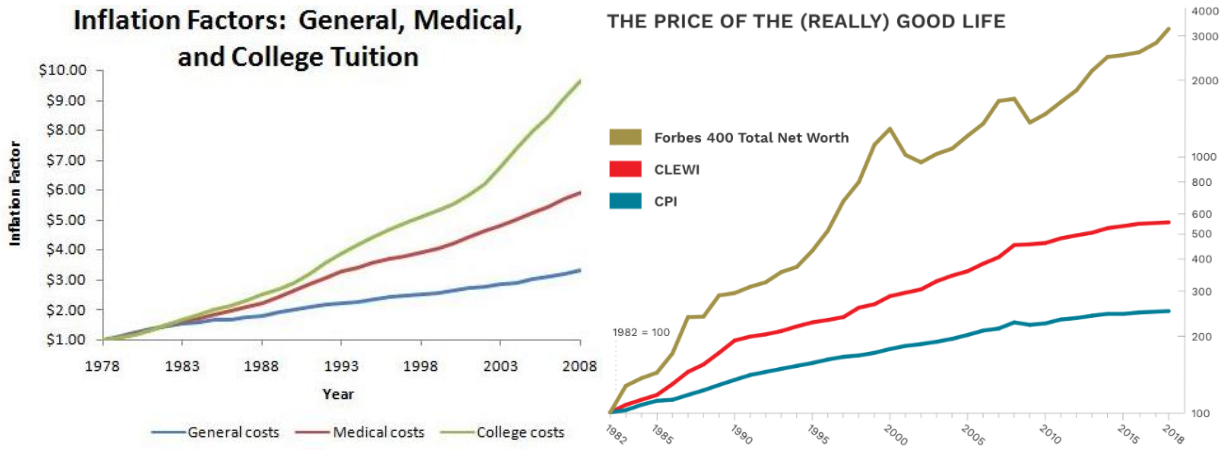


Figure 20 - Source: Bureau of Labor Statistics and the College Board [35], Forbes [36].

On the other hand, when you send stimulus checks to the entire population during a pandemic, CPI increases to the highest levels since the 1970s.

This is all to say that if you are an upper-middle class individual with the majority of your wealth in the stock market, you are not gaining inflation-adjusted buying power relative to the population for anything besides food and basic staples within the CPI. This could be sufficient if you are entering retirement, but in a world where bonds had their worst performing year since the late 1700s and seem to have lost their strong negative correlation with stocks, it is imperative to think about portfolio construction differently.

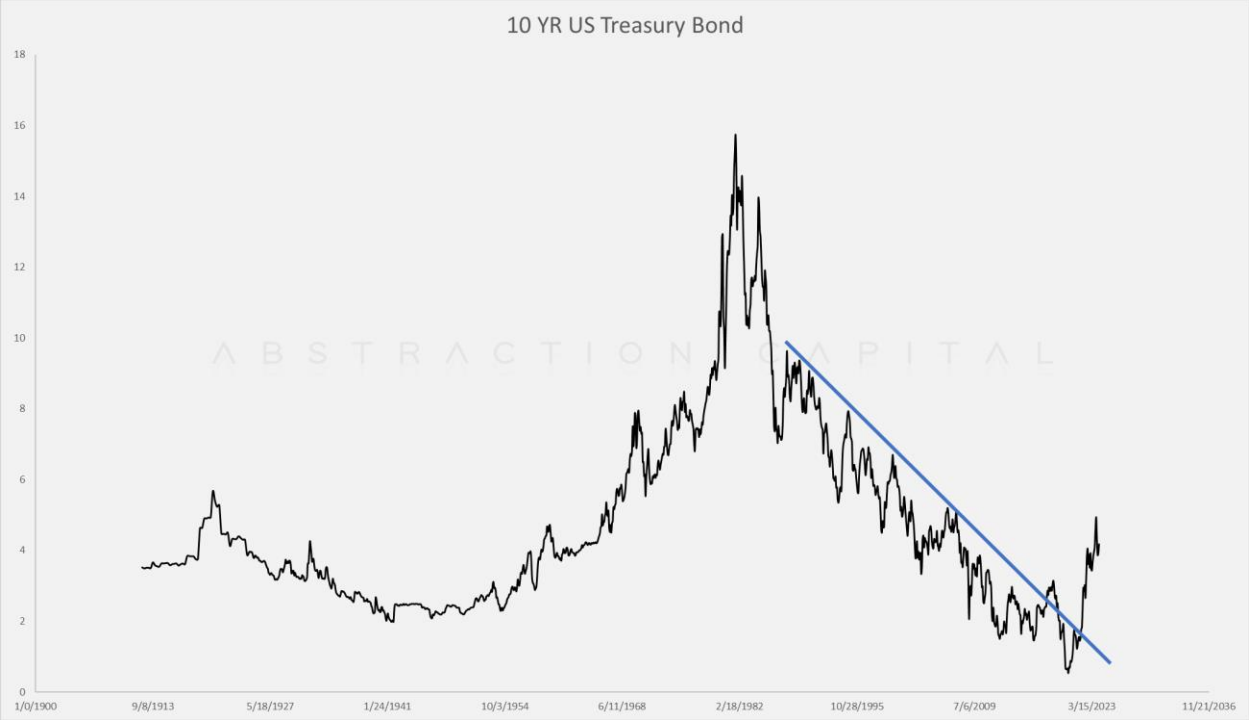


Figure 21 - 10 Year US Treasury Bond 30-year trendline break, marking a secular change in interest rate policy and inflation dynamics.

With the government running massive fiscal deficits, the value of bonds will continue to deteriorate. Foreign investors are not purchasing US treasuries in the same quantity as before, and the US is having to flood the market with supply to receive the funding they need. Sure, you can lock in what may seem like a high yield (5%), but this only seems high because of recency bias. What if a 10-year treasury yields 10% in a few years marked by another surge of inflation? Your bonds will have lost 20% (or more) of their value[11].

I am not arguing that the S&P 500 or bonds are a bad investment. That is foolish – the only way the S&P or US Treasury Bonds lose value over an extended period of time is if something catastrophic happened, and in that case we will all have bigger problems. What I am arguing, though, is that one should highly consider a 60-30-10 portfolio, where the 10 is crypto. For the last 40 years bonds were utilized to smooth out the volatility and bolster returns of an equity portfolio. If the stock-bond negative correlation is weakened in the decade ahead due to the government running massive fiscal deficits, then adding some crypto to one's portfolio can achieve the same effect that bonds used to provide.

It appears that the most likely way the market goes down in a regime of fiscal dominance is when the Fed has to raise rates to combat inflation. Although this hurts stocks and crypto in the short term, in the long run crypto benefits more from money printing. Bitcoin is up over 14x from it's Covid low whereas the Nasdaq is up only 2.6x. By 2030 the S&P could be significantly higher than it is today, *but adjusted for*

[11] The amount lost depends on the initial coupon rate and months to maturity.

inflation it could be flat. In this scenario where the government and Fed continue to inject liquidity into markets, crypto will necessarily perform better than stocks.

Finally, one must remember it is not a sure thing the S&P 500 goes up by 10% a year. What if the index makes marginal highs for the rest of the decade with substantial volatility similar to the 1970s? Although there undoubtedly be stocks that perform well (such as tech and AI stocks), the index could underperform. This means selecting good companies (or crypto protocols) will be the only way to generate alpha. In the scenario that the global financial system does adopt this technology, the market cap of the winning crypto protocols will skyroket. A portfolio allocation of 10% could end up being worth 50% of your portfolio in 10 years. The smartest people on the planet either believe Bitcoin is going to a million dollars a coin or 0. There is no other asset on Earth that shares this characteristic. This is not a coin flip, where the net expected value of a 50-50 probability event is one (you lose everything or double your money). In the next 2 years with rising liqudiity conditions and the entire market already nuking 80% post FTX, the downside of holding Bitcoin over the next 20 months is muted. Similarly, the upside is much greater than a 2x. The asymetric return profile, combined with the historically zero correlation to stocks, provides the greatest investment opportunity (in the context of a 60-40 portfolio) since modern portfolio thoery was invented.

5 Conclusion

Olaf Carlson-Wee, founder of Polychain Capital presents an interesting way to think about Bitcoin and other decentralized computing infrastructures:

"Bitcoin is an abstract incentive machine that people get plugged into. The Bitcoin Network or Ethereum network are operated by machines, but ultimately these systems control humans. They manipulate human incentives to drive humans to work for them." [37]

The largest crypto protocols are effectively automated companies that provide some service to society and pay individuals a combination of equity and salary to perform network services. The equity distribution (in Bitcoin's case, the Block Reward) is algorithmically defined within the code of the protocol, and the salary component is the sum of network fees distributed proportionately to the network operators. This structure allows decentralized networks to be bootstrapped, solving the chicken and egg problem. When equity allocation algorithmically diminishes, a winning protocol has substantial fees to continue to incentivize operators to power the network.

I recently learned that Uber gives only 25% of the profits to drivers. For a recent ride to the airport, my driver informed me that he would make just over $5 for my $25 ride after fees. This does not account for gas or cleaning costs. A peer-to-peer ride sharing service powered by crypto infrastructure and an intelligent AI to handle logistics could return nearly 100% of the profits to drivers. This is why decentralized protocols are incentive machines. When the services provided by 3rd party intermediaries are replaced by individuals operating a peer-to-peer network, costs are compressed toward the minimal bound, not to mention counterparty risk is effectively removed for financial services. The now late Charlie Munger's insightful quote remains relevant: *"Show me the Incentive and I'll show you the outcome"*. The cheaper, more efficient, and less risky system always wins in the long run. Whether it was Carlson-Wee getting wrapped up into this thing 10 years ago, or myself just over 6 years ago, crypto has a way of getting you to work for it. Crypto is a black hole for the world's time and capital and in due time everyone will be working for a decentralized protocol. As I discuss in my Chainlink Investment Thesis, in a few decades with advances in AI and robotics even a service such as Amazon's shipping and delivery could become decentralized [38].

The winning decentralized protocols of this decade will go on to become larger than any individual company. Imagine if you had to purchase Amazon stock to pay for anything you order on amazon. This would inject a multiple on the Amazon market cap due to the mechanics of asset exchange. Purchasing $1 of a stock could increase the market cap anywhere from 5 – 500 times that amount, per the inefficient market hypothesis [39]. Now imagine instead of Amazon, we were discussing a stock for the HTTP or TCP/IP protocol, where you had to pay a fee any time you went to a new website. Finally, consider this asset was programmatically perfectly scarce. Every commodity in the world has elastic supply because as demand increases, production is ramped up. Even gold does not have a fixed supply, as the total gold stock increases by 1.8% per year when new gold is mined out of the ground. It is impossible to imagine what will happen to the prices of the winning crypto assets because humanity has never seen these conditions exist before with an asset. Crypto adoption could look like a commodity Supercycle, such as oil in the early 1900s, but one where the supply of the underlying assets are perfectly inelastic.

All of this is occurring while the legacy systems that defined the previous generation are breaking down. One of the hallmarks of human civilization is the ability for people to "vote with their feet" and immigrate to countries with fairer laws. This is what America was built on. In a world where there is no new land to go to, migrating to the digital world is our only hope. How else will we rebel against corrupt politicians who continue with superfluous debt expansion and funding wars that we have no business in?

As a result, I believe the next decade will yield the largest wealth redistribution event in multiple generations. As the world adopts decentralized financial infrastructure, all wealth will be transferred from the old system to the new. A global, permissionless, and tamperproof financial system is a necessary precursor for every human to engage on a quest for personal freedom.

I will leave you with a short response from a personal hero of mine, Eric Weinstein, on the question of how the internet is changing the world. [40]

Daniel Shapiro
Founder & Chief Investment Officer
Abstraction Capital

2010: How is the Internet Changing the Way you Think?

Eric R. Weinstein
Mathematician and Economist; [ex-] Managing Director of Thiel Capital

"GO VIRTUAL YOUNG MAN"

Oddly, the Internet is still invisible to the point where many serious thinkers continue to doubt whether it changes modern thought at all.

In science we generally first learn about invisible structures from anomalies in concrete systems. The existence of an invisible neutrino on the same footing as visible particles was predicted in 1930 by Wolfgang Pauli as the error term necessary to save the principles of conservation of energy and momentum in beta decay. Likewise, human memes invisible to DNA (e.g. tunes) were proposed in 1976 by Richard Dawkins as selection, to remain valid, must necessarily include all self-replicating units of transmission involved in tradeoffs with traditional genes.

Following this line of thinking, it is possible that a generalized Internet may even be definable with sufficient care as a kind of failure of the physical world to close as a self-contained system. Were a modern Rip van Winkle sufficiently clever, he might eventually infer something like the existence of file sharing networks from witnessing the collapse of music stores, CD sales, and the recording industry's revenue model.

The most important example of this principle has to do with markets and geography. The Internet has forced me to view physical and intellectual geography as instances of an overarching abstraction co-existing on a common footing. As exploration and trade in traditional physical goods like spice, silk and gold have long been linked, it is perhaps unsurprising that the marketplace of ideas should carry with it an intellectual geography all its own. The cartography of what may be termed the old world of ideas is well developed. Journals, prizes and endowed chairs give us landmarks to which we turn in the quest for designated thinkers and for those wishing to hug the shore of the familiar this proves a great aid.

Despite being relatively stable, the center of this scientific world began to shift in the last century from institutions in Europe to ones in North America. While there is currently a great deal of talk about a second shift from the U.S. towards Asia, it may instead happen that the next great migration will be dominated by flight to structures in the virtual from those moored to the physical.

Consider the award in 2006 of the Fields medal (the highest prize in mathematics) for a solution of the Poincare Conjecture. This was remarkable in that the research being recognized was not submitted to any journal. In choosing to decline the medal, peer review, publication and employment, the previously obscure Grigori Perelman chose to entrust the legacy of his great triumph solely to an Internet archive intended as a temporary holding tank for papers awaiting publication in established journals. In so doing, he forced the recognition of a new reality by showing that it was possible to move an indisputable intellectual achievement out of the tradition of referee gated journals bound to the stacks of university libraries into a new and poorly charted virtual sphere of the intellect.

But while markets may drive exploration, the actual settlement of the frontier at times requires the commitment of individuals questing for personal freedom, and here the new world of the Internet shines. It is widely assumed that my generation failed to produce towering figures like Crick, Dirac, Grothendieck or Samuelson because something in the nature of science had changed. I do not to subscribe to that theory. Suffice it to say that issues of academic freedom have me longing to settle among the noble homesteaders now gathering on the efficient frontier of the market place of ideas. My intellectual suitcases have been packed for months now as I try to screw up the courage and proper 'efficient frontier mentality' to follow my own advice to the next generation: "Go virtual young man."

Disclaimer

Nothing written in this paper should be considered financial advice by Abstraction Capital. Invest at your own risk, and never more than what you can afford to lose.

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