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Analyzing Crypto (Part 1) - As A Currency

A study on if crypto can become a new medium of exchange and innovations to come

In Part 1, I assess cryptocurrencies as a medium of exchange and their validity as such. How well can crypto serve as a form of payment and what are the risks associated with using and deploying cryptocurrencies as a currency?

In Part 2, I consider cryptocurrencies as an asset class. Here, the main points will be to analyze the investment risks and performance associated with crypto assets.

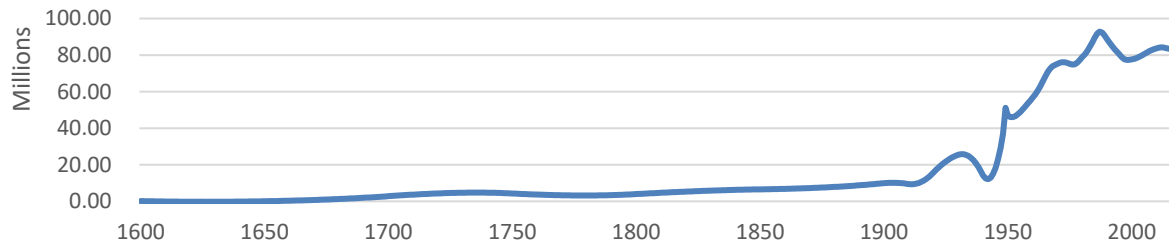
In Part 2, I will also build a portfolio of some of my favorite and well-known crypto currencies. We'll write a Python program which optimizes the Sharpe ratio, Sortino ratio, and Calmar ratio based on past performance. Next, we'll utilize our own projections for future performance, volatility, and maximum drawdown to build the optimal portfolio possible based on our own projections.

The Perfect Storm

Given the current and unique economic environment we see ourselves in; the perfect storm seems to have developed which has propelled cryptocurrencies into an important emerging asset. Most central banks around the world, in response to COVID, Delta Variant, and now OMICRON are printing vast amounts of their own currency and are devaluing their currency as a result.

At the same time, we see bond rates at near zero with a few national bonds still seeing negative rates. This has many adverse effects on countries and to those who hold their debt. In the eyes of many, cryptocurrencies have emerged as a potential hedge against these factors. However, in the past year there have been huge developments in the crypto space. Namely, WEB 3.0 and DAPPs which provide much needed utility for this new asset class.

Exhibit 1: Absolute increase in global population per year 1600 – 2017



Source: OWID based on HYDE & UN. Absolute population change measures the net increase in total population in any given year e.g., data for 1950 represents the net change in total population from 1950 to 1951.

The Evolution of Money

As seen in **Exhibit 1** the population of mankind has exploded, with a shift of **59.6k percent in population growth from 1600 to 2007**. To accommodate this rapid increase in population, humanity has been compelled to dramatically alter many of its systems.

Money as we know it now is the consequence of numerous innovations in order to have a medium of exchange that can keep up with the increasing transaction volume that comes with a rising population. Not only has money undergone significant modifications, but so have transportation systems, energy systems, political systems, and so on, all in the name of providing for the populace.

The most apparent illustration of how a rising population has driven its development is money. When people lived in tiny communities at the start of civilization, trade was based on labor sharing. All resources were shared, and one person would hunt while another looked after the community dwellings. When people became more widespread, a labor exchange rapidly proved impractical. Towns began to act as trading hubs to facilitate the exchange of products; there was still a labor exchange, but it was far exceeded by the trade of commodities.

Fiat currencies are currencies that are not

backed by any physical object; in other words, fiat currencies are money generated out of thin air. This was required because if mankind relied solely on commodities, individuals who exchange labor would be unable to be rewarded in a timely manner since money would be so scarce. The need for unfathomable-sized transactions to be transacted across borders and at lightning-fast speeds is growing all the time.

People use social media to communicate with one another all around the world. Today, everyone in the globe may freely communicate with anyone else; you can livestream in America while someone in Egypt watches you with a tiny delay. If an American wishes to send money to relatives in the Philippines, however, fees can be exorbitant, especially for those small transactions, and the transaction can take hours or days to complete.

Bitcoin was born out of the market's desire for low-cost, quick cross-border transactions. The first of its kind, a currency which purely exists through code and only on the internet. **Crypto like Bitcoin transcends borders, jurisdictions, and centralized locations giving it access to all parts of the world and independence from any institution.** However, Bitcoin, like other currencies, has limits, but thanks to human ingenuity and technological improvements, new cryptocurrencies have emerged to address Bitcoin's shortcomings.

The Blockchain & Smart Contracts

Digital currencies are not new (Chaum, 1983) nor is the idea of supplementary currencies (Delmolino et al., 2016) however, the concept of a digital currency with a “peer-to-peer” system; or a system that lacks central distribution is new.

A blockchain, in the most basic sense, is a way to track and store information that cannot be changed. To elaborate, the blockchain is a chain of “blocks of information” which hold the transaction information, a hash (derived from the data), and the hash of the previous block. As a result, any information that is altered or erased changes the hash, breaking the authentication between blocks. To fix this problem a hacker must change all blocks in the blockchain simultaneously which is nearly impossible and would immediately become apparent to security. This is what makes the blockchain so secure.

The blockchain is also constantly evolving and every cryptocurrency may have a different set of laws. They may even alter how such regulations are implemented within the system. For example, Ethereum makes use of blockchain-based smart contracts built on decentralized consensus and automated execution.

Smart contracts, in a conflict-free and algorithmic manner, permit the exchange of money, property, financial and other services, or simply the exchange of anything of value. Without smart contracts, centralized authorities such as data monopolists would have complete control over if, when, and how information is given to the market, and traditional resolutions would need arbitrators or courts of law, which would increase

risk and uncertainty.

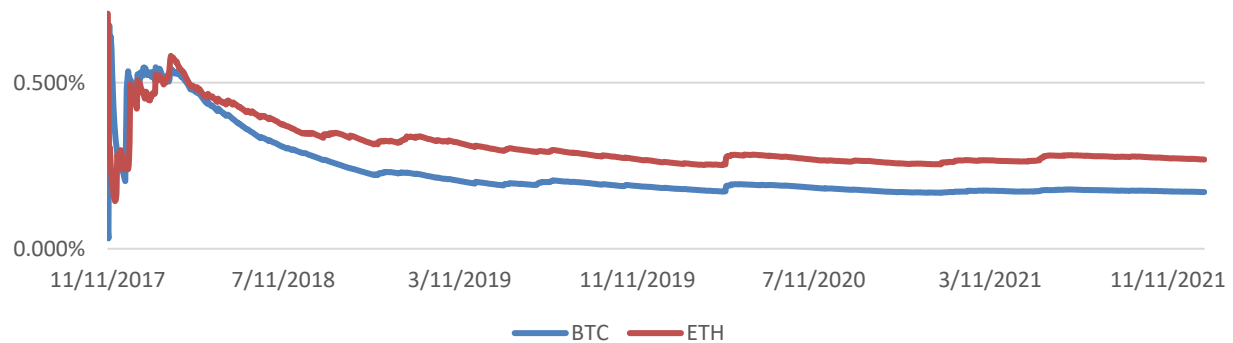
From politics, to infrastructure, to banking, crypto through smart contracts has the potential to transform almost anything. For example, take the problem of peer-to-peer lending. Traditionally an individual may do this one of two ways, through a bank or directly. Lending or borrowing through a bank has fees, credit checks, and risks of the bank itself claiming bankruptcy. Lending or borrowing directly involves a tremendous amount of trust and risk.

Smart contracts through decentralized apps (DApps) such as AAVE allow for non-custodial lending and borrowing directly on the blockchain. This removes risk completely for lenders (investors never lose money outside of investment risks) as AAVE uses algorithms within the smart contracts to liquidate the collateral of borrowers that reach their liquidation threshold.

Transparency is another revolutionary idea that the blockchain may also provide. Cryptocurrencies like Bitcoin are opensource and all information is publicly available; if you know where to look. Every bitcoin can be traceable through the blockchain to see who owned the coin and where it has traveled. This makes criminal activity through cryptocurrencies like Bitcoin traceable to the bad party or more accurately to their crypto wallet and any money sent from and to the blockchain can be whitelisted from all applications. In politics you could also trace where your political donations are being spent and where your tax money is being applied. That could be invaluable knowledge in the fight against corruption.

Exhibit 2: Rolling Daily Volatility for BTC and ETH

November 11, 2017 – December 31, 2021



Source: Yahoo Finance. Rolling daily volatility measures the historical volatility on each day and rolling to the next e.g., data for ETH august 5th 2018 represents the average volatility of ETH from the start of November 11th 2017 to august 5th 2018.

Cryptocurrencies As A Medium of Exchange

There are many opportunities and risks for cryptocurrencies. To identify these benefits and threats, you must first understand what a cryptocurrency is. Our policymakers and elected leaders, to no one's surprise, can't seem to agree on what this latest asset is. The SEC views it as a security, the IRS as property, and the CFTC treats these digital assets as a currency/commodity.

If used as intended by their creators, cryptocurrencies would be a currency. However, for a currency to be deemed a currency a few conditions must be met. A currency must have both a reliable storehold of wealth and have the ease and speed of exchange:

Note: Not all crypto coins are cryptocurrencies. There are 7 different classes of crypto (Wolfgang, Karl Hardle et al., 2018). It is important to understand that not all crypto coins are intended to be used as a medium of exchange and that I am discussing only those that may be meant as a means of bilateral trade.

Storehold of Wealth

“No reasonable person will store their wealth in a currency with extreme volatility.” The probability of their wealth halving or completely evaporating is too much a risk for most. In **Exhibit 2** we can see that as cryptocurrencies like Bitcoin and Ethereum establish a history and enter the later stages of their life cycle, the volatility of the asset will begin to normalize. As that happens and as liquidity increases, more institutional buy-and-hold investors will invest in Bitcoin. This will act as a domino effect, lowering volatility and increasing institutional buying.

For example, we can experience this unfolding today. As the volatility of Bitcoin and other established currencies declines, more institutional buyers are acquiring crypto, and since institutional purchasers are often long-term investors, volatility is likely to fall even further, creating a feedback loop of decreasing volatility.

Ease and Speed of Transaction

Just five years ago, buying goods with cryptocurrencies was nearly impossible, and

there were no easily accessible exchanges that enabled the transfer and use of cryptocurrencies. Today, this is far from the case. PayPal, Venmo, Shopify, and hundreds of other companies have started allowing U.S consumers to use their cryptocurrency holdings to pay at their millions of online and in-person merchants domestically and internationally.

During the year 2021 alone, significant progress was made in promoting the ease and speed of cryptocurrency exchange. China and the Marshall Islands, for example, have already developed their own crypto assets to be utilized in domestic and international transactions. The adoption of crypto assets has been rising, and it will be fascinating to watch where the industry will be in five years.

Risk of Cryptocurrencies

If the government decided to battle crypto and ban its use, most people who would use cryptocurrencies would stop using them. As a result, demand would plummet, as would the majority of the value of these crypto coins, undermining their price and short-term future prospects. Until a clearer picture of how regulators will treat cryptocurrencies becomes clear large institutional buying will remain limited.

Another risk lies in the programming of these cryptocurrencies. 1st Generation coins such as Bitcoin create large welfare loss from the expense of mining and computing transactions. Bitcoin, to include Ethereum, also have a major flaw in their scalability. Bitcoin can only process 7 transactions per second and Ethereum can only process 15 transactions. To put that in perspective Visa can process 25,000 transactions per second. Gas costs (transaction fees) for these cryptocurrencies might reach \$100 or more as a result of the strong demand for transactions. This goes against the very purpose of crypto, which was to allow for rapid and low-cost cross-border transactions.

Fortunately, the crypto community is fast to adapt, and 3rd Generation coins like Solana are now capable of processing 50,000 transactions per second. The transaction rate of Ethereum 2.0 is estimated to be 100,000 transactions per second. Gas fees will be cut to near zero, allowing cryptocurrency to mature into what it was meant to be.

The message here is that today's cryptocurrencies must evolve or be phased out. Bitcoin cannot be used for bilateral transactions if it can only process 7 transactions per second. It may still be used as a store of money, but it is absurd to believe that Bitcoin will continue to be the leading crypto if it is exclusively used as a store of wealth

Cryptocurrencies Moving Forward

To put it plainly, the future of cryptocurrencies and crypto in general is now quite bullish. More organizations and

financial businesses are allowing their clients to transact and invest in bitcoin on a daily basis. Third generation cryptocurrency

developers are addressing many of the flaws that plagued first and second-generation cryptocurrencies.

The emergence of 3rd Generation cryptocurrencies in conjunction with decentralized apps (DApps) has the potential to alter the world in the same way that the internet has done all these years since its debut. Together with DApps, cryptocurrency has the ability to decentralize practically every aspect of our financial and online life. I explained

before how lending and borrowing through a decentralized program run on the blockchain reduces the majority of the risk associated with the activity. Thousands more DApps are being built, and some of them have the potential to dramatically transform the way we do business and live our personal lives. Individuals, and especially businesses, should prioritize knowing and staying current on the latest advancements in crypto and DApps.

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