VALUE INVESTING FRAMEWORK IN CRYPTOCURRENCY

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INTRODUCTION

Cryptocurrencies are decentralized digital assets that utilizes cryptography as an encryption mechanism for security purposes. Beginning with Bitcoin, at the time of the 2008 global financial crisis, the idea was to create a currency independent of any central authority that could be electronically and securely transferred with low transaction fees.

To enable the functionality, the technologists use what is known as blockchain technology. Unlike traditional method of exchange in which a fee-driven centralized party is usually involved to facilitate a transaction (e.g. the role of escrow company in a real estate transaction), blockchain technology provides a permanent record of transactions between any given party that is confirmed and verified by a network of computers, or nodes. It is these nodes that are continually updating the blockchain when new blocks of transactions are added.

By using the blockchain, parties conducting transactions between each other don't need to reveal their identities, and the transaction doesn't need to be verified by a fee-based third party, yet the accuracy of the transaction is thoroughly vetted by a participating network. At its inception, the aim of the blockchain is to deliver an immutable record of data that is transparent, secured, and reliable.

In this short paper, I'd like to share my opinion on why blockchain technology, which promises a securely enhanced transaction velocity will become increasingly important in the future. Through a well-known monetary theory, we will derive and understand the economic value of transaction time mathematically as well as its influence on an economy's GDP. From this insight, I will give you a tour on the current monetary policy in many developed countries and then demonstrate how developing countries, such as Vietnam, will be greatly benefited from a more optimized payment experience.

Furthermore, as crypto asset is probably one of the newest investment vehicles in the world of investing, a growing number of investors predominantly rely on qualitative attributes and/or technical indicators to determine the value of a crypto asset. And groundless speculation has led to high volatility level or risk typically associated with this asset class (evidently presented in the roller-coaster movement of BTC in the second half of 2018). Thus, the economic literature from this paper will enable us to derive a concrete valuation framework for cryptocurrency, which helps investor to identify solid and financially sound projects empowered by it.

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WHY TRANSACTION TIME MATTERS?

Besides the obvious reason that the improved transaction time will lead to better user experience, which in turn, lead to better customer engagement, the value of transaction time can be broadened at an economic region or even at national level, in which monetary policy is dictated. In fact, it could be proven that the change in Transaction Velocity is positively correlated to the Gross Output of the economy (aka. GDP). To understand this relationship, let us review a well-known theory in monetary economic – the Quantity Theory of Money ("QTM")

ORIGINS OF QTM

The Quantity Theory of Money states that the general price level of goods and services is directly proportional to the amount of money in circulation, or money supply. The QTM traces its origins back to the 16th-century writings of Nicolaus Copernicus and Jean Bodin. It was more formally developed by David Hume and Richard Cantillon in the 18th century, before being restated in its recognizable mathematical form by Alfred Marshall and Irving Fisher around the turn of the 20th century. Arguably, the central tenets of the theory have remained intact through all of its transformations, challenges and policy debates through to the present day.

The formulaic form of the theory is:

$$M \times V = P \times Y$$

Where:

- M = Total amount of money in the economy (Money Supply)
- V = Velocity of circulation of money
- P = General price level in the economy
- Y = Total number of services and products in the economy

For a simple example, let's say that in a certain economy there are $1,000 supply of money (M), if the economy produces 1,000 transactions (Y) at an average price of $5 (P). Then money velocity (V) is equal to 5. In other word, the money supply in the economy needs to change hand 5 times so that the economy will reach to that production level.

CHANGE IN PRODUCTION LEVEL OF AN ECONOMY

With the formulaic form of QTM:

$$M \times V = P \times Y$$

Apply the logarithmic function to both sides to break out the product form into summation:

$$\log(M \times V) = \log(P \times Y)$$
$$\log M + \log V = \log P + \log Y$$

We can now take derivative both sides. As a quick reminder, $d(\log x) = \frac{1}{x} dx$

$$d(\log M) + d(\log V) = d(\log P) + d(\log Y)$$

$$\frac{dM}{M} + \frac{dV}{V} = \frac{dP}{P} + \frac{dY}{Y}$$

The factor of $\frac{dx}{X}$ represents a small change in X value with respect to X in instantaneous time. For more business-familiar language, it's the percentage change in X value. Hence, we can rewrite our formula as:

$$\%\Delta M + \%\Delta V = \%\Delta P + \%\Delta Y$$

The QTM derivative form shows that CHANGE IN MONEY SUPPLY + CHANGE IN MONEY VELOCITY is equal to CHANGE IN PRICE LEVEL + CHANGE IN TOTAL TRANSACTIONS in the economy. Let us take sometimes to discuss these relationships.

- In a certain economy, if the Central Bank keeps printing money to have surplus in Money Supply (% Chg. M > 0) without improvement in Money Velocity (% Chg. V = 0) and if the economic activity remains unchanged (% Chg. Y = 0), the surplus of Money Supply will simply lead to increase in price level (% Chg. P) or inflationary economy.

- In a certain economy, if the Central Bank keeps the same amount of Money Supply (% Chg. M = 0) and Price remain unchanged (% Chg. P = 0), then the change in economic activity (% Chg. Y) is solely driven by change in Money Velocity (% Chg. V). The faster the money can change hand, the more output the economy can produce (a growing economy)

Many other relationships can be derived from this elegant formula. At this stage, I'd like to give you a quick tour on current monetary policy from many developed countries to present the traits of QTM influence all over these policies.

- Let's start with United States (USA) and EU countries – Since the Pandemic in March 2020, various economic activities have suddenly come to a stop by stay-at-home order. Without a doubt, this incident will have a tremendous impact to GDP. To respond to this, these governments have been pushing to increase Money Supply in the economy (trillion dollars-worth of relief packages) and set priority to control pricing of basis goods and services. Furthermore, these governments utilized ACH technology to directly deposit relief fund into each citizen's bank account the next day with the hope of faster money circulation in the economy. With the QTM knowledge, you can now realize that all these policies are aimed to ensure a growth in GDP (or **% Chg. $Y > 0$**)

- Let's move to an Asian economic tiger, Japan. While being a leader in many technological advancements, Japan suffered from nearly two decades of deflation until 2013 (where price level continually declines), which caused GDP contraction to almost 22% during the period. Although there are mixed opinions, many economists believe that the sluggish economy was partially attributed by a tradition of citizens not spending money (note that not spending is different from savings) Effectively, this tradition led to negative change in Money Velocity (when people halted the circulation of currency), and caused price to go down (**% Chg. $P < 0$**)

- Lastly, let's talk about Vietnamese monetary policy from the QTM perspective. Vietnam GDP has been growing consistently in the past decades at 7%-10% level. Thanks to strong foreign investment and local enterprises creating more goods and services to maintain a high level of transaction activities in the economy. However, due to heavy reliance in cash transaction (almost 90% of all transactions), the Money Velocity in Vietnam is considerably weak. So, to meet the transaction demand, government needs to continue printing money to keep surplus Currency Supply in the market. However, this policy then caused price to increase and led to higher inflation rate. Such circular issues can only be resolved by improving the payment ecosystem and transaction culture with the goal to enhance faster Transaction Time. We have seen that, since 2019, Vietnamese government has been pushing to change the payment culture and has garnered some successful milestones.

At this point, I hope that I'm able to convince you that a speedy transaction velocity is very important in the context of economic management. Apart from immediate benefits of customer experience improvement, change in Transaction Velocity is a source to fuel further economic growth. With this said, the blockchain technology and subsequent development (ETH or KardiaChain) have arose at the right timing. Hence, the faster adoption of such secured and swift transaction method is the key to maintain a growing economy in many developing countries.

Now that you have felt comfortable with QTM knowledge, I'd like to take you a next step, which is to utilize QTM literature and develop a valuation framework for cryptocurrency.

PRACTICAL APPLICATION OF THE QTM TO UTILITY CRYPTOCURRENCY:

From QTM, one can swiftly make an algebraic arrangement to attempt valuing the currency:

$$M \times V = P \times Y$$

or

$$P = \frac{M \times V}{Y}$$

In applying the QTM to utility tokens, we shall define and discuss each of the quantities within the Quantality Theory of Money as it relates to a utility system.

Money Supply

The money supply within a utility token system can be considered as a combination of two quantities. The first is a long-run fixed **M'**, i.e., the total number of tokens determined by the developer upon issuance. The second is a float factor, f, equal to one minus the percentage of tokens retained in reserve by the issuer. The issuer's short-run reaction function, and thus the behavior of **f**, requires further study, but this quantity should converge to 100% over the long run.

$$Money\ Supply\ (M) = M' \times f$$

Where:

- M' = the total number of tokens (determined at issuance)
- f = float factor (existing currency units in circulation)

Money Velocity

The public nature of the distributed ledgers underpinning utility token systems makes money velocity an observable quantity i.e., the inverse of the average period for which a token is held by one address. To estimate the velocity for tokens before its issuance, i.e., before its own velocity becomes observable, we would consider it reasonable to estimate velocity by reference to comparable tokens. For the currency that already in circulation, one can evaluate the Mney Velocity by transaction volume over the past 24 hours divided by Total Number of Coin in Circulation.

$$Token\ Velociy\ (V) = \frac{T}{C}$$

Where:

- T = Total transaction value in the past 24 hours
- C = Average network value (market cap) in 24 hours

We would like to note that the choice of 24-hour period is subjective. Some experienced traders utilize annual or monthly numbers for a smooth estimation. However, for the cryptocurrency that observe recent events such as new listing exchanges, new skated programs, or token dilution, a shorter span of review will probably result in more representative value.

Volume of goods and services transacted

The estimation of the volume of goods and services transacted, i.e., the "GDP term" of the QTM, to constitute the key area of estimation. In a utility token system, this term will equate to the overall value of the services rendered through the system during a specified period. As an example, if an utility token system is designed for hard drive storage sharing. Such a system would effectively meet part of the global demand for remote file storage, and the value of the services rendered through it would thus be determined by the size of the overall market for remote file storage and the share of that demand met by the system. In another example, for the token that is used as one of the payments for users to make gaming prediction on a certain platform, we could collect the total betting volume on that platform(s) that were paid in all payment methods and the market share of the subjected token.

Effectively, we consider it useful to decompose the GDP term, Y, into two further terms: market size, "**D**," and market share "**s**." Our valuation approach for a utility token would focus on deriving reasonable estimates of these quantities. Of course, such estimation involves considerable judgment and complexity. However, we believe the valuation process should drive understanding of the fundamental value of the proposition and indicate the degree of confidence with which an investor might transact in a utility token at various price levels.

$$Volume\ of\ Goods\ \&\ Services\ (Y) = D \times s$$

Where:

- D = market size potential
- s = market share

Price Level

Given their nature, utility token systems benefit from the external reference point of fiat currency prices. The volume of goods and services transacted can thus be input as a fiat-denominated quantity, leaving the remaining, unknown variable P also denominated in fiat currency terms. For clarification, we note that an increase in the price level corresponds to inflation, which reduces the value of a currency. In the context of utility tokens, we therefore bring together our application of the QTM in a formulaic form that expresses the fair value of a token, ***tp***, in terms of the remaining quantities

$$\boldsymbol{tp} = \frac{1}{P} = \frac{Y}{M \times V} = \frac{D \times s}{M' \times f \times \frac{T}{C}} = \frac{D \times s \times C}{M' \times f \times T}$$

Where:

- **tp** = fair token value
- D = market size potential
- S = market share
- M' = total token supply
- f = float factor
- C = average network value in the past 24-hour
- T = total transaction volume in the past 24-hour

To illustrate the above formula, let's examine price target for a cryptocurrency that was designed to enable gaming wager on a platform on a given day:

- D = 100,000 (average number of bets placed in a system per day)
- S = 2% (average number of bets placed via the cryptocurrency)
- M' = $12,500,000 (market value at issuance)
- f = 30% (number of currency unit in circulation % total units)
- C = $4,000,00 (observable from a coin exchange)
- T = $800,000 (observable from a coin exchange)

$$tp = \frac{100{,}000 * 2\% * \$4{,}000{,}000}{\$12{,}500{,}000 * 30\% * \$800{,}000} = \$0.0026$$

The structural equation above provides us with a quantitative method to estimate price target for a cryptocurrency on a given day. More importantly, this deterministic framework may allow investors to quantify the future value of a token by translating the management strategic initiatives and targets into quantifiable assumptions.

For example, for the crypto asset above, if Management set the goal to raise market share from 2% to 10% in one year and explore other gaming platform to increase market size by 30%. And assume that in one year the market may see an additional 5% of this cryptocurrency due to the company unlocking more coins. With these attributes, an investor can evaluate the future value of the token as:

- D = 130,000 (+30% in market size)
- S = 10% (increase from 2% level)
- M' = $12,500,000 (market value at issuance)
- f = 35%
- C = $4,000,00 (observable from a coin exchange)
- T = $800,000 (observable from a coin exchange)

$$tp = \frac{130{,}000 * 10\% * \$4{,}000{,}000}{\$12{,}500{,}000 * 35\% * \$800{,}000} = \$0.014$$

Note that I keep C & T values to be the same as above based on the assumption that token velocity would remain constant in a year. While this may sound problematic in other asset classes, management of crypto companies could actually control the velocity based on staking programs, which offer interest payment to investors for holding their coins to avoid pump-and-dump or high selling pressure from traders with get-rich-quick schemes.

Of course, just like anything else, "past performance is no guarantee of future results." The framework that we have derived here should not be viewed as a crystal ball to warrant an expected return. However, this framework is very useful to help an investor to make an educated guess of the future value based on guidance from project management team. At the minimum, it would help an investor to ask Management team the right questions before making investment decision.

CONCLUSION

Through this paper, I hope that I have successfully guided you through the Quantity Theory of Money and garnered a better understanding of the economic value of Transaction Time. As I mentioned, because of the unique nature of cryptocurrency that offers a secured and swift transaction channel, I believe that blockchain and its subsequent technologies will become increasingly important in the future.

Additionally, due to the "store of value" nature of crypto currency and the market practice of relying on qualitative considerations when determining the value of a crypto asset (even certain commentators' belief that no framework for the valuation of utility tokens exists), we consider it particularly important to draw attention to the available option. Using the foundational theory of monetary economy QTM, which is particularly very relevant to the idea behind cryptocurrency, we have derived a methodology is helpful in providing insight into value creation and give investors a useful sense-check against more directly market-based inputs in their decision making.