Token Valuation: Business Perspective

Abstract. Tokenomics is a crucial instrument for companies that plan an initial coin offering (ICO) or engineer blockchain-based services. The token economy model should provide the rules by which tokens rotate in the created system and allow external financing. Despite the extensive growth of the blockchain market size and number of tokenized projects, no ready-made scheme of economic choice for token production was developed. Thus, the value predicting problem for one or another token provides a new area of multidisciplinary research. This study analyzes some of the existing approaches for token valuation, which can be used for business purposes. The primary purpose is to suggest a framework towards a universal model of the token economy.

Keywords: tokenomics, ICO, models of token valuation, cryptomarket, crypto-currencies, digital business models, blockchain

1 Introduction

Development of blockchain technology during the last decade provided companies with innovative methods of monetization and created a new market ecosystem. A body of literature on the blockchain technology and economical models around it is steadily growing [1-6]. Many publications have attempted to collect the state-of-the-art knowledge on these subjects.

According to Gartner, the ICO market passed its local peak [7,8] showing rapid, even though not steady, growth in the number of ICOs and amount of funds raised. Since the massive adoption of cryptocurrencies, the blockchain technology attracted attention of people outside the community of early adopters and narrow IT-specialists, many well-known mass media and consulting companies have been trying to explain to the general public what the basic concepts are.

One of the most interesting issues within the framework of token economy is the problem of choosing the economy for the initial placement of tokens. Since projects have different focus, product and service type, the economy will also vary in these parameters. However, there is still no ready-made scheme of economic choice for token production, which does not allow predicting the value of one or another token.

In this paper, we discuss the concepts of token and tokenization in the context of crypto markets and new models of startup financing. First, several financial models for the use of tokenization ae considered. These models are compared with each other in order to define essential parameters of token economy. As a conclusion, we suggest a possible direction for a generalized method of the economy of ICOs.

1.1 Tokens and tokenization

Long before the cryptocurrency era, the term “token” has been used defining a value medium alternative to an official currency (e.g., [10]). In a context of this study, token is a digital asset. It is different from cryptocurrency, since it does not necessarily have the property of fiat money or be rotated outside of a certain company's system. In addition, token guarantees only an exchange for a certain product or service and only within the system in which it is used, however, can be expanded to a more general usage.

Most companies use tokens to raise funds for the development, as well as immediately incentivize the client base. However, there are many examples of companies produced tokens inefficiently, which lead to the collapse of such “bubbles”. Researchers name several types of tokens, including a currency token, a digital asset, or a share in a startup [4].

Here, we consider tokens as digital assets with currency properties, i.e., utility tokens. As examples, it is more convenient to focus on IT projects, where client operations can be described in terms of user activities. To analyze any token economy of a company from financial perspective, one should consider a process of value creation. First significant aspect I such analysis is the influence of fluctuations on the token rate. Second, the impact of the success (e.g., size of the user base) of the project on the token value. Another problem is an estimation of token-fiat conversion, which connects the token ecosystem to the global market economy.

We use the term “tokenization” to denote the process of translating (moving) rights to a real asset into a digital token. Simply put, having a tangible item, such as a computer motherboard, one can convert parts of it (or access to it as a service) into tokens. Such a mechanism allows digitization of any item, from the table to real estate, including services. Advantages of such approach are that tokens: 1) attract and simplify investments; 2) incentivize investor’s participation in the project; 3) reduce the operational costs and ease asset management; 4) increase liquidity of assets; 5) use secure blockchain infrastructure; 6) eliminate intermediaries; 6) increase transparency of transactions. However, there are some shortcomings as well: 1) legally unregulated or partially regulated field; 2) lack of consistency in technology and infrastructure; 3) complexity of digital identification; 4) conflict between market speculations with tokens and their purpose for company.

1.2 Token economy

The token economy is the emission of tokens in order to change or stimulate specific behavior of system participants in order to create strong communities with a single mission to organize valuable crypto-active assets. In other words, tokenology is a system of formation of token pricing policy. At the moment, there is no single model of token economy formation, but many scientists and market members are trying to derive a unique model of token emission. Several general rules of tokenomics formation can be derived from the discussed properties.

1. *Number of tokens issued.* The number of tokens produced is always limited and depends on how much money the company needs to raise on the crowdsale. The initial price of tokens depends on the volume and number of tokens. After the first stage of

token emission, the company can analyze the demand for its tokens, which will allow to more carefully schedule the further production model.

2. *Token function.* Here, it is very important to take into account which product or service the company provides for its tokens. This may be some physical product, service or right to anything. Depending on the uniqueness, popularity, and actual demand for this token function, this way the direct cost of the token is formed.

3. *Investment attractiveness.* The ICO organizers need to understand the value of their tokens for the investor and for what reason they will store them. In order for the token price to increase continuously, it is not beneficial for issuers to have their tokens constantly exchanged in the system. It is beneficial to them that investors keep them on their wallets. However, it is necessary to look at the growth of tokens in aggregate, rather than separately. Sometimes it can be unfair speculative actions of large players.

4. *Demand.* Successful development of the token ecosystem requires constant growth in demand. As in any economic market, the growth of demand for goods provokes the growth of their price. But it is always necessary to know what this demand is provoking and whether it is "healthy".

5. *Turnover of tokens.* Another indicator that affects the cost of tokens is the turnover of tokens. To find it, you need to calculate the ratio of annual income to the total capitalization of tokens. Growth will occur when the income exceeds the capitalization.

6. *Market balance.* This indicator can be divided into two factors. The first one is the balance of supply and demand. The token price will increase if the number of sellers is less than the number of new buyers. The second factor is the balance between active exchange and passive storage of tokens. Here it is important that the number of investors and traders remains in the same ratio.

Therefore, the token price is influenced by many factors. Each of them has a greater or lesser influence depending on the business model itself. However, in any case, it is necessary to base on what function the token has for the buyer. This is the main point in the formation of the future token economy.

2 Token economy models

This paper is dedicated to an ongoing stage or research and covers only the simplest models of token economy. There are more involved examples (e.g., [10]), which lie beyond the scope of current discussion. In this section, we analyze cases in order to understand which specific parameters are the most important in building tokenomics of the company.

2.1 Model 1

Consider the two similar models by J. Kilroe [11] and K. Samani [12], who write about the effect of the speed of tokens in the system on their price. Many studies use the classical equation of exchange or turnover of tokens, which is applied to the economy of fiat money and taken from the theory of monetary policy as:

$$MV = PT$$

where M is the money supply, V is the speed of money circulation, P is the average price level of goods, T cost index. This formula is valid for any market economy of fiscal money. In the token economy, C. Burniske and V. Buterin [13] suggested a similar expression. Burniske determined that:

$$MV = PQ$$

where M is the size of the asset base, V is the speed of the asset (the number of times the average token changes ownership), P is the price of the digital resource provided, Q is the number of digital resources provided. Based on this, we get:

$$M = PQ/V$$

That way, we can calculate the size of the asset base. That is, in order to determine the token price, we need to calculate M by determining the market size in dollars (PQ), dividing it by the speed (V), and then dividing M by the number of coins in the stock. The above equations show that minimizing the speed of the coin will result in the most expensive coin. This is not the case, because speed also correlates with transaction volume (T), so in a "healthy" economy a certain level of currency movement is required. Therefore, if all the tokens are in stake with zero trade, then the volume of transactions drops and the price of each coin goes down.

Butlerin writes that this system can be easily manipulated because it suffers from positive feedback effects. Briefly, if the price of a token starts to rise, people can store it because it is perceived to be more profitable than an alternative token, that is, speculation. More speculation increases the price of the token until a new equilibrium is achieved. However, this process also works in the reverse order - because people sell coins, their storage becomes more expensive compared to other tokens. The more people sell, the lower the price becomes. Essentially, since there is no need to keep a token, the price is only related to speculation. In addition, as decentralized exchanges and other systems are launched, the speed must increase, given the even lower barriers to token exchange, which should further reduce the price.

It is clear, that ideally velocity is kept within a certain range. However, the range itself requires additional research. Thus, in order to maintain healthy token savings and sustain token value, the economic design must optimize the T/V ratio, where T and V are linked. For token economies, the optimal ratio is still not defined and is likely to be different for each of them.

2.2 Model 2

Consider another model by F. Kruger [14]. Firstly, it defines the main variables that will be involved in the construction of the model: TS - total number of tokens in circulation; P - current token price; HT - time of token retention in the ecosystem for 1 year; TV - transaction volume per year in $; GTV - growth of transactions (TV) per year; TT - transaction time; $TMCap$ - market capitalization of tokens, where T$MCap = TS * P$.

Ratios take the forms:

- $R = TV / TMCap$ - ratio of transaction volume to transaction market capitalization;
- $R1 = R / TT - R$ evaluation metric is corrected for transaction time;

- $R2 = R / HT$ - another estimate based on token retention times.

In order to create a model of economy, it is necessary to follow certain rules, according to which this model will work effectively:

1. HT should be as much as possible.
2. $HT > TT$.
3. The economy of tokens changes over time, it cannot be accurately described in Whitepaper.

   Many authors, including K. Samani, show that companies performance do not reflect 100% of the token economy. However, this does not mean that the economy is simply not calculated. Since tokenics is variable, it can be defined and refined after ICO.
4. Once the token is fully operational, R should be well below 10.
5. One should have a reason to buy tokens, not just earn them.

   In the previous analysis it was supposed that there was actually a trade turnover - in other words, tokens were not just distributed, they were bought. But not all ICOs are modeled in this way. Many new investors claim that tokens should be given away for nothing, including tokens with a zero income model.
6. It is better to calculate $R1$ and $R2$ than R in net value.

   However, this model ignores the token retention time (HT). If the average retention time is actually 6 months, the ecosystem stores 50% of all tokens. In this equilibrium, any new growth will lead to higher token prices.
7. Growth is important.
8. One needs an economy where sellers become buyers.

Summing up, it is very difficult to model token prices. There are ways to analyze and promote this topic. Main aspects:

- High growth or high probability of growth;
- Incentives for people in the ecosystem to retain tokens (either long transaction times that cause retention, or general incentives to retain/fine for failure);
- Reasonable transaction volume (or the ability to see it) relative to market capitalisation.

2.3 Model 3

Another interesting case is presented by R. Kodzhimatov [15]. The author thinks that token economy is an attempt to quantify life and give a price to everything. Hence, most utility tokens are just “bubbles”. In his opinion, the mechanism of tokenization suites where it creates additional value.

According to this analysis, the most successful type of tokens are service tokens. Service tokens are any tokens that provide a legal service to consumers and are not primarily tools for intermediaries or speculators, although such agents exist in his model.

The economic model of tokens under consideration is very versatile, so that it can work both as a project for future token creators and as a theoretical basis for economists. Ideally, the model can also serve as a reference point for writing technical documents.

As tokens are aimed at structures which cannot be trusted, it will be necessary to have some proof that each knot corresponds to one person, instead of some bot. As we know, the service is paid for with a fixed number of tokens, not cash. Fixed token pricing service will correctly reflect the proportional relationship between demand and price - the more demand for the service, the more people will buy tokens, the higher will be the price of tokens, as well as the cash equivalent of the service, and vice versa.

In the presented model there are consumers, investors, honest and dishonest miners, each of which has different motives and types. Consumers and malefactors want the price of the token to fall, while honest miners and investors want the price of the token to rise. Incentives must be modelled in such a way that no player wants to deviate from a fairly stable system as long as there is a fair majority (notional balance). The system will use the Ethereum Casper checkpoint voting model, as it provides a responsible safety and a plausible life model, provided that 2/3 of the votes are honest. At the end of the work, Kodzhimatov simulates the resulting economy without going into technical details. At the same time, the system should take into account both active and passive tokens, where the former take part in voting, while the latter do not.

Here, tokenomics at a specific static point in time was considered. Additional dynamic analysis is needed to see how this model performs over time. These conditions should be included:

1. The economy starts when developers create a protocol and generate all tokens. We assume that there is only one creator.
2. The creator distributes a certain percentage of all tokens to early experts who agree to work for tokens instead of cash and do not sell them for at least a certain period of time. At the same time, we assume that all early Expert Advisors are honest miners. The rest of the tokens are sold at ICO. The decision on how many tokens to keep, how many to sell and how many to distribute involves a large process of modeling and optimization, which we simplify.
3. Consumers decide whether to subscribe to the service by buying tokens or to choose other service providers. Investors decide whether to buy tokens or shares. Unscrupulous miners decide whether buying tokens and voting will increase their short-term profits.
4. All market participants are identified and active tokens are prohibited from voting.
5. The majority of votes wins, and the bets of losers are cut and equally redistributed among the winners.
6. Nested cash consumers and investors are calculated and added to the price formula. The current token yield is calculated as $(1 + \Delta pt / pt)$.

2.4 Model 4

The next briefcase looks at C. Burniske model [15]. The first thing that should be noted in the crypto-evaluation is that companies do not have cash flows. Therefore, the use of discounted cash flow analysis (DCF) is not suitable. Instead, for the evaluation of crypto-assets it is necessary to establish models, structurally similar to DCF, with a

forecast for each year. But instead of revenues, margins and profits, use the exchange equation to derive current utility for each year (CUV). Then, as the market prices of the assets are determined by future expectations, it is necessary to discount the future utility of the services back to the present to obtain a rational market price for any year.
In its own protocol, the crypto-asset serves as a means of exchanging, storing value and accounting unit. Thus, by definition, each crypto asset serves as the currency in the protocol economy it supports. Since the exchange equation is used to understand the cash flow needed to support the economy, it becomes the cornerstone for the valuation of crypto-assets.

The exchange equation $MV = PQ$, and in the case of crypto-assets, is interpreted as (this formula was discussed in case study 1):$M$is the size of the asset base; V - asset speed (the number of times the average token changes owner); P - price of the provided digital resource; Q- the amount of digital resource provided.

Crypto-asset valuation mainly consists of finding M, where $M = PQ/V$. M is the size of the monetary base required to support the crypto-economy of the PQ size at V speed. The first thing to note is that P does not represent the price of a crypto asset, but instead the cost of the resource provided by the crypto network. Therefore, the GDP of a crypto network is represented by the volume of transactions in its crypto-asset chain. Turning now to V, the speed shows how many times an asset passes from hand to hand in a given period of time. By converting $MV = PQ$, we can calculate $V = PQ / M$.

Finally, the asset base, M. Here we use the average size of the asset base during the year, which is necessary due to the inflationary nature of the asset. Accounting for the expanding monetary base is particularly important for younger crypto-assets, which can be classified as hyperinflationary, with an annual growth rate of 20%.

Now that all the variables of the exchange equations and the idea of a common market and interest rate penetration into this market have been considered, another key concept has emerged: discount rates. In order to address this issue, Burniske considered the INET fictitious token model. This model shows the crypto-economy of a fictional token called INET. It works to participate in providing bandwidth through its decentralized virtual private network (VPN). All the models that Burniske had built before had 4 parts - A, B, C and D. Section A calculates the number of tokens in use, section B quantifies the protocol's economics using the exchange equation, section C forecasts the percentage of crypto usage in the target market (which is reported in section B), and section D discounts future utility.

3 Parameter Analysis

Summarizing the experience of relatively simple models discussed above, in order to build a proper tokenomics model, one needs correct input data. These parameters are taken from considerations of token type to be offered, and reason of its emission. Moreover, there is an inseparable binding to the external market - what percentage of the existing market the company plans to occupy. However, the question arises: if the company acts on a new unexamined market, how to calculate the capitalization? In order to

understand what share of the external market a token economy will occupy, one should not only compare this token to existing similar tokens, but also to the proposals on investment of funds available on the fiat market. To understand more specifically what considerations are taken into account when calculating the parameters, we will go through the parameters of each model separately, as well as compare the model with each other for a complete analysis.

The main calculated parameter in all models is the token price (P). The token's demand for the token itself depends on the token's price, and vice versa, the token's demand forms its price. Finding the token price in the models is determined differently. In the third case we find the price through the cost and interest, while in the fourth case the author evaluates the price on the market average.

Another important factor is time. This includes transaction time (TT), token retention time (HT) and everything related to future indicators (model 4). All these metrics are very subjective and require a qualitative analysis of the current market situation.

The fourth model is more suitable for service tokens, such as data warehouses or cloud solutions. The third model is for tokens of the type of cryptocurrency or digital asset. The first two cases tell about the rules of building such models, rather than some specific calculations.

From the analysis of cases we can highlight a number of features and rules to be followed when calculating a new model. All of these recommendations concern the parameters and metrics used in the construction of the economy.

1. It is important to understand what product or service you want to provide and what value it will bring to the consumer. This forms the basis of all the ideas about the economy of the project.
2. All subjective parameters that cannot be calculated at once can be found in several ways:

A) Analyze the token market for similar projects and see how they calculate it;

B) Analyze the token market as a whole and look at trends in the parameter of interest;

C) Analyze the external economic market for competitors in your target segment.

3. In case there are no competing projects in the economy of tokens, or in the foreign economy, it is necessary to consider what alternative variants of investments will attract (what benefits) in comparison with your project.
4. It should be taken into account that the accuracy of your calculations depends on how versatile you consider your model. Here, competitors, both inside and outside, are important, as well as the overall economic situation in the global market.

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