STEX's valuation analysis, version 0.0

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ABSTRACT

In this paper we evaluate an investment consisting of paying an given amount (the STE token price) and taking monthly profits from commissions, that will be distributed among all holders of STE tokens. We use traditional economics metrics to show some scenarios of dividend yield over time.

1 PRELIMINARIES

Traditionally, the most used variables to evaluate an investment are Price-Earnings (P/E) ratio and Earning Yields. In order to get these values, it's necessary to calculate the Earnings Per Share (EPS). The EPS is the portion of a company's profit allocated to each outstanding share of common stock. The basic definition is

$$\text{EPS} = \frac{\text{net income} - \text{dividends (commissions)}}{\text{supply (quantity of tokens)}}. \tag{1}$$

The price-earnings ratio (P/E ratio) measures the current token price relatively to its earnings. The P/E ratio can be calculated as

$$\text{P/E} = \frac{\text{market value per token}}{\text{EPS}}. \tag{2}$$

The Earnings yield is defined as the EPS divided by the token price. In other words, it is the reciprocal of the P/E ratio, expressed as a percentage

$$\text{Earnings yield} = \frac{1}{\text{P/E}}. \tag{3}$$

2 MAIN FORMULA AND SIMULATIONS

To simulate some economic scenarios, we will use the followings variables:

- m_v - daily trading volume of all the cryptocurrency market

- m_s - STEX's market share
- γ - STEX's trading fee
- v_c - STEX's variable costs
- f_c - STEX's fixed costs
- N total STE supply

Thus, we define the projection formula for dividends per STE-token as follows:

$$\text{dividends per STE} = \frac{m_v m_s (\gamma - v_c) - f_c}{N}. \quad (4)$$

Leting m_v and m_s vary, we get the following dayli commisions, using equation 4 :

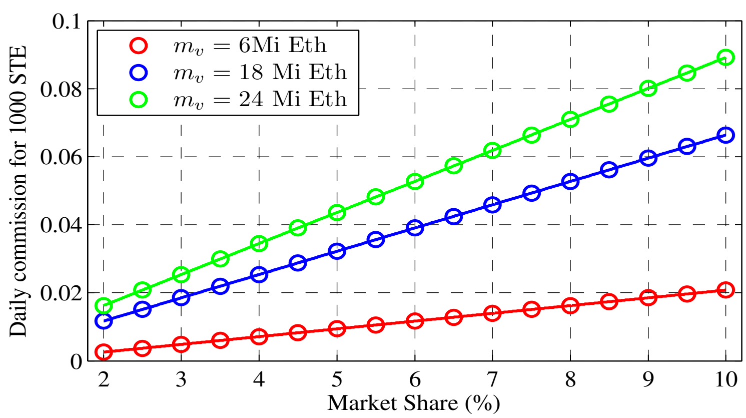


Figure 1: Daily commissions for 1000 STE tokens and $N = 50$M, accordingly to market share, using three values of daily volume.

Note that the daily volume is based in the past trading volume of the cryptocurrency market. For 1000 STE, with a 5% market share and $m_v = 18$M Ethereum (Eth), the daily dividends would be 0.0322 Eth. For a yearly analysis, using the same parameters, we obtain a EPS of $= 0.0322 \times 365.25 = 11.76$[1] Eth. Analysing the P/E, considering that the token was acquired in the pre-sale phase we obtain the following results:

[1] we use 365.25 to consider the weighted average of the leap year.

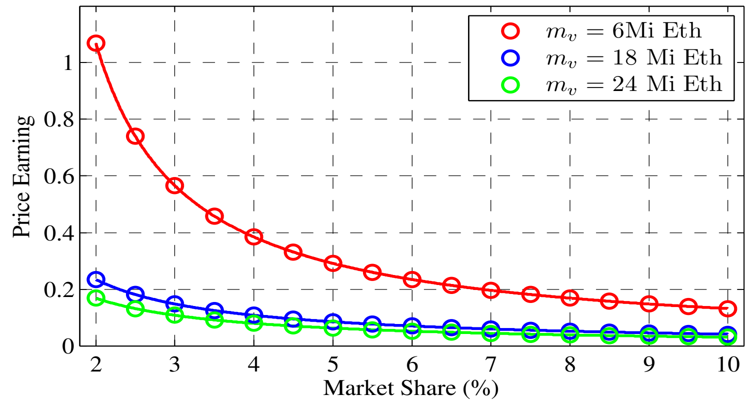


Figure 2: P/E with pre-sale phase price.

For m_v = 18M Eth and a 5% market share we have P/E = 0.085; in other words, in this scenario the pre-sale buyer is investing 0.085 Eth for every 1 Eth of earnings. For m_v = 6Mi Eth, and a 2% market share, we have P/E = 2.13 for buyers of the ICO phase (1 Eth = 500 STE), that is, in this scenario the purchaser is investing 2.13 Eth for every 1 Eth of earnings.

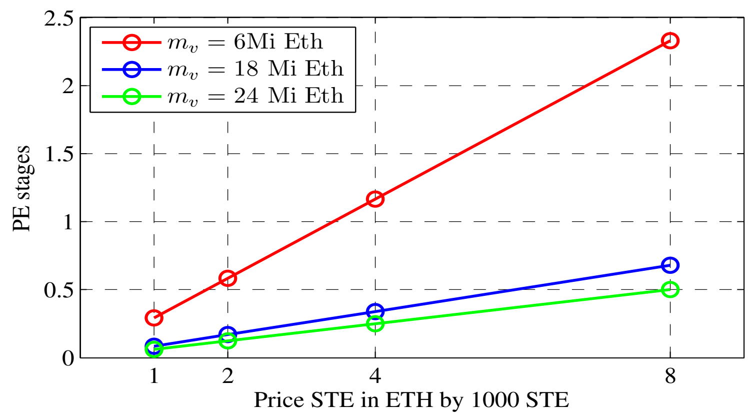


Figure 3: P/E ratios for the different phases of STE token sale, assuming a 5% market share. Here, $x = 1$ indicates the pre-sale phase (1000STE= 1Eth), $x = 2$ indicates the first ICO stage (500STE= 1 Eth), $x = 4$ indicates a second stage (250STE= 1 Eth) and $x = 8$ indicates a third stage (125STE= 1 Eth).

The best case scenario shown on the Figure 3 is, as expected: m_v = 24M, P/E = 0.06279 and purchase made at the pre-sale. The worst case is, also as expected: m_v = 6M, P/E = 2.33 and a purchase made at the last stage of the ICO.

Now, assuming a market volume of m_v = 18M Eth and evaluating the P/E ratio for each m_s and token stages we obtain the following results:
The best case scenario shown on the Figure 4 is: m_s = 10%, P/E = 0.041 and purchase made at the pre-sale. The worst case is m_s = 2%, P/E = 1.88 and a purchase made at the last stage of the ICO, both scenarios as expected.

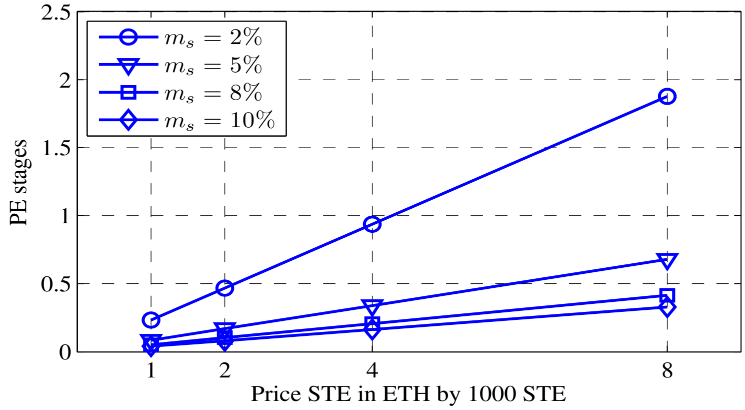


Figure 4: P/E ratios for the different phases of STE token sale, assuming a 18M ETH/day market volume. Here, $x = 1$ indicates the pre-sale phase (1000STE= 1Eth), $x = 2$ indicates the first ICO stage (500STE= 1 Eth), $x = 4$ indicates a second stage (250STE= 1 Eth) and $x = 8$ indicates a third stage (125STE= 1 Eth).

The earnings yield is a tool used to measure returns. Here we analyse two price scenarios: 1000STE= 1 Eth and 500STE= 1 Eth, for each value of m_s and m_v.

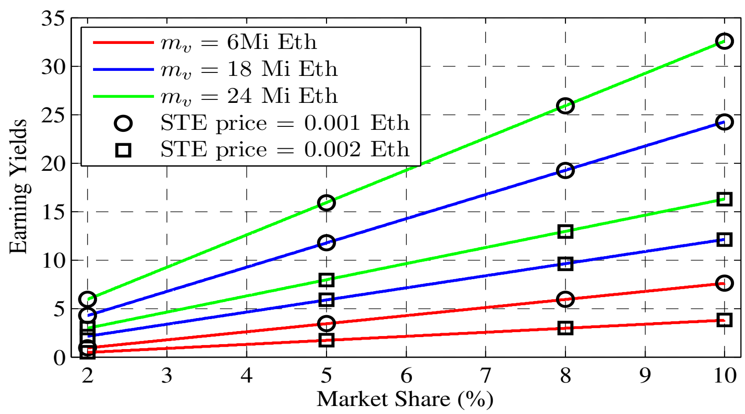


Figure 5: Earnings yield of the two selected price scenarios

Until this ponit, all the analysis were made considering that all STE-holders do not sell their tokens over time, i.e. all STE-holders receive the same amount of dividends. In a more realistic scenario, we need to consider that some investors will sell their tokens at some point. If any token is sold, the buyer of that token will now be entitled to 80% of the dividends and the remainder (20%) will be distributed among investors who never sold their tokens, (investors who bought STE tokens in the pre-sale phase or ICO). We created two charts, both with a m_v = 18M Eth and each one with one parameter of m_s:

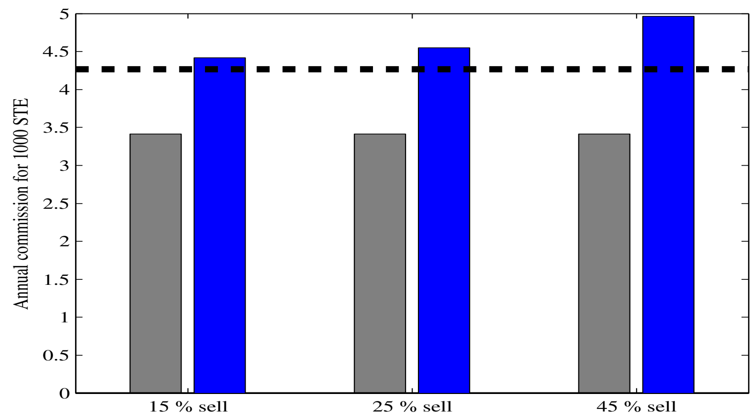


Figure 6: Yearly dividends for m_v = 18M Eth and m_s = 2% (the dashed line represents a scenario where no one ever sells their tokens)

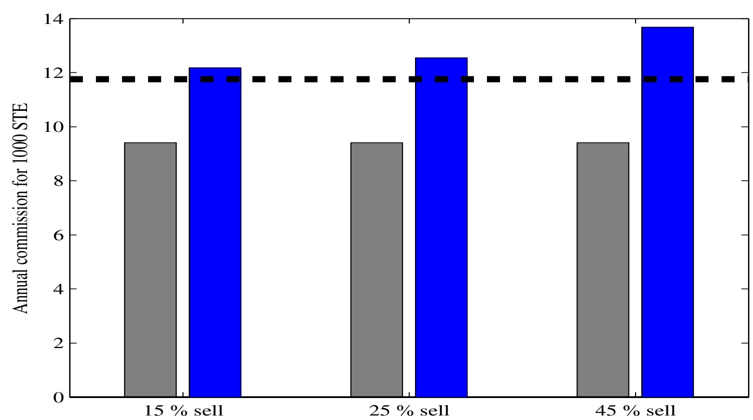


Figure 7: Yearly dividends for m_v = 18M Eth and m_s = 5% (the dashed line represents a scenario where no one ever sells their tokens)

3 The Stochastic Model for a stock price

We will describe a stochastic process for modeling a stock price -here, token price and stock price means the same- with Wiener process (sometimes called Brownian motion process), see Feller (2008). We can simulate the stock price using the two following variables: an expected `drift rate` (the average variation per time) and a `variance rate`. Usually, a model assuming a constant drift rate fails, because the expected percentage of return must be independent of the stock price. If investors require a 14% per annum return when the stock price is 10, then, they will also require a 14% per annum return when it is 50.

Thus, the assumption of constant expected `drift rate` is inappropriate, and needs to be replaced by the assumption of a constant expected return (`rate of return` - i.e. the drift rate divided by the stock price).

Mathematically, let S be the price of the stock, t the time and μS the drift rate in S, with a constant μ.

For a small time interval Δt, an increase in S of $\mu S \Delta t$ units is expected. Here, μ is the expected rate of return. If there is no uncertainty about the price we can write the differential equation

$$\Delta S = \mu S \Delta T, \tag{5}$$

applying the limit $\Delta t \to 0$, we have the following differential equation:

$$\frac{dS}{dt} = \mu S, \tag{6}$$

which solution is $S(t) = S_0 e^{\mu t}$, with S_0 being the stock price at the time $t = 0$. In other words, when there is no uncertainty, the stock price grows at a constant rate μ. But this is the just an ideal case, in practice there will always be some uncertainty. Thus, a reasonable hypothesis is to assume that the variability of the return on the time interval Δt is the same as the stock price. That is, the standard deviation of the returns in that interval must be proportional to the stock price, that leads us to a stochastic differential equation

$$\frac{dS}{S} = \mu dt + \sigma dz, \tag{7}$$

where σ is the volatility of the stock price (variance per time). The dz is an increment of the Wiener process (see Hull and Basu (2016)). It is a particular type of Markov stochastic process with a mean change of zero and a variance rate of 1.0. It has been used in physics to describe the motion of a particle that is subject to a large number of small molecular shocks and it's sometimes referred to as Brownian motion. Formally, a variable z follows a Wiener process if it has the following two properties:

Property 1. *The change dz during a small period of time Δt is*

$$dz = \vartheta \sqrt{\Delta t},$$

where ϑ has a standard normal distribution $\phi(0,1)$.

Property 2. *The values of dz for any two different short intervals of time, Δt, are independent.* It follows from the first property that dz itself has a normal distribution with

$$\begin{aligned} \text{mean of } dz &= 0 \\ \text{standard deviation of } dz &= \sqrt{\Delta t} \\ \text{variance of } dz &= \Delta t. \end{aligned}$$

The model of stock price behavior developed above is known as geometric Brownian motion and this process is useful for modeling of stock prices over time when the percentage changes are independent and identically distributed. If we consider the case of discrete time, we have

$$\frac{\Delta S}{S} = \mu \Delta t + \sigma \vartheta \sqrt{\Delta t} \tag{8}$$

where ΔS is the change in the price of the stock S over time, that is, the return. The uncertainty here is represented by the term $\sigma \vartheta \sqrt{\Delta t}$ which is now a stochastic component of the return and $\mu \Delta t$ is the expected value of the return. Also remember that the variance is the standart deviation squared, thus the terms of this equation are approximately normally distributed, denoted by $\mathcal{N}(\mu\Delta t, \sigma^2\Delta t)$ with mean $\mu\Delta t$ and variance $\sigma^2\Delta t$, i.e

$$\frac{\Delta S}{S} \sim \mathcal{N}(\mu\Delta t, \sigma^2\Delta t).^{2} \tag{9}$$

3.1 Monte Carlo and simulation

A Monte Carlo simulation of a stochastic process is a procedure for sampling random outcomes for the process. We will use it as a way of developing some understanding of the nature of the stock price process in equation 8. The following pictures describe the typical evolution of the STE price. We considered volatility estimatives based on the average variance of Ethereum and Bitcoin prices in the last year. In the present days these two coins represent more than 60% of the market, so the prices of all other cryptocurrencies are strongly related with these.

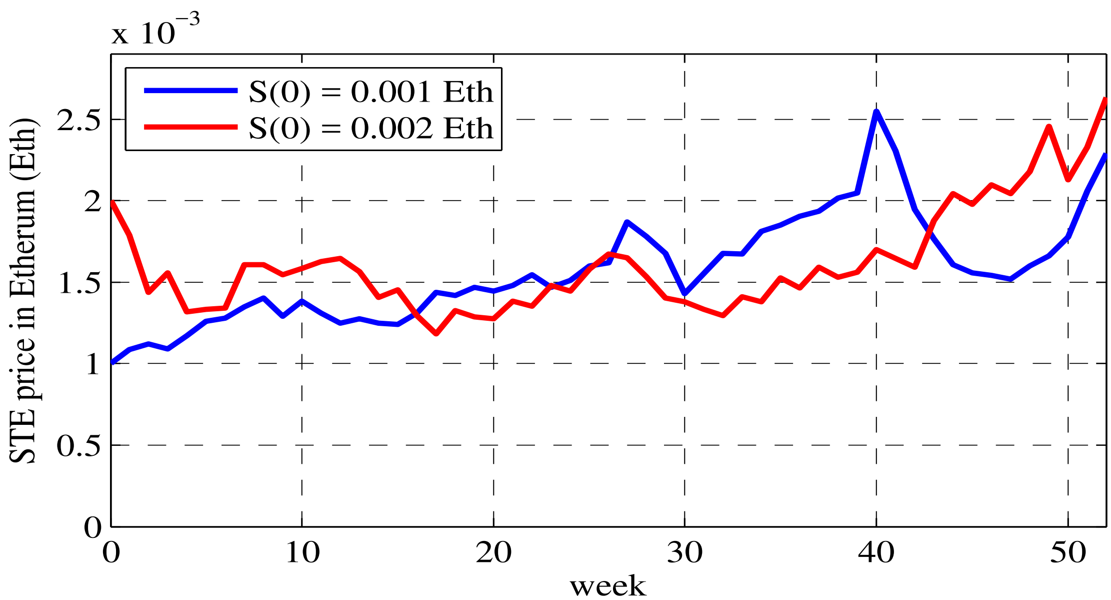


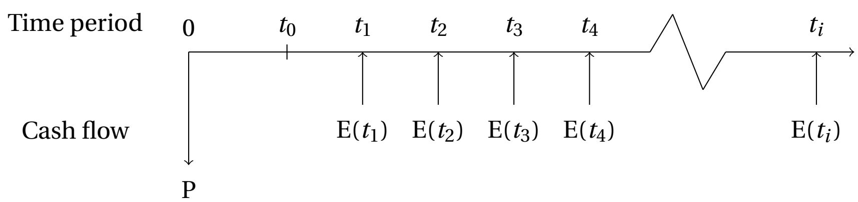
Figure 8: Monte Carlo simulation for price prediction of STE-token, with the token prices of 0.001 and 0.002 Eth/STE.

[2] The probability density of the normal distribution is $f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$.

4 DISCOUNTED CASH FLOW

In this section, we will evaluate the investiment using a Discounted Cash Flow. We will assume that the cost of capital is the higher low risk fixed income rate available to the cryptocurrency market, that is, the higher lending rate of the major exchanges. In the present day, 0.0117%/day is a very good rate, so we'll proceed using the montly rate α equivalent to this (0.35159612%/month).

The investiment consists in paying an amount P at the time of the ICO (time zero) and receiving monthly amounts after the exchange kicks off (time t_0, that we are assuming to be 5 months from the ICO). We will use the very conservative hypothesis of a constant market share of 5%(the value expected by the market team to be achieved in the first year of operation) and a constant volume cryptocurrency market. That implies that the monthly earnings E will be constant.



Finally, to evaluate the investiment, we have to estimate the lifespan of the hypothesis above. We will evaluate using a 5 years lifespan. We don't mean to imply that the exchange will shut down after five years, but, in this risky and volatile market, it's hard to sustain and assure a market hypothesis for too long. With these assumptions, we can calculate the Present Value PV of the monthly earnings:

$$PV(E) = \frac{1}{(1+\alpha)^5} \sum_{i=1}^{60} \frac{E}{(1+\alpha)^i} = \frac{1}{(1+\alpha)^5} \frac{1-(\frac{1}{1+\alpha})^{60}}{\alpha} E \approx 53E$$

Since the estimated monthly earnings for 1000STE range between 0.2867 Eth and 1.3298 Eth (with a market share 5% and a daily volume of trading ranging between 6 millions and 24Mi Eth), we have a fundamental price valuation of the token between 0.0152 Eth/STE and 0.0705 Eth/STE, which is way more that any of the early stages of the ICO.

REFERENCES

Feller, W. (2008). *An introduction to probability theory and its applications.* John Wiley & Sons.

Hull, J. and Basu, S. (2016). *Options, futures, and other derivatives.* Pearson Education India.