Stock Call Options calculation using Black Scholes Model

$$Vc = Po\ N_{d1} - \frac{X}{e^{KRf * t}} N_{d2}$$

$$d_1 = \left[\frac{\ln \left[(Po/X) + (K_{RF} + .5\,\sigma 2)\,t\right]}{\sigma\sqrt{t}}\right]$$

$$d_2 = d1 - \sigma\sqrt{t}$$

Vc *=value of call*
N = normal distribution value
Po *= stock price = $40*
X = Exercise price = $45
σ = standard deviation = 40%
t = time = 4months (120/365)
Rf = risk free rate = 3%

$$d1 = \frac{\left[\ln\left(\frac{40}{45}\right) + 0.5\,(0.40)^2\right] {}^{120}\!/_{365}}{0.40\sqrt{\frac{120}{365}}}$$

$$= \frac{-0.1178 + (0.03 + 0.5(0.16)\ 0.3288}{0.13152}$$

$$= \frac{-\ 0.1178 + (0.11)0.3288}{0.13152}$$

$$= \frac{-0.081632}{0.13152}$$

D1= -0.6208

= ~ -0.62

D2= d1 - σ√t

$$= 0.62 - 0.40\sqrt{\frac{120}{365}}$$

= -0.62 - 0.13152

D2= -0.7523

= ~ -0.75

Checking up the value of D1 and D2 on Normal Distribution table

D1= -0.62 (0.26763) d2= - 0.75 (0.22663)

Substitute into the "**Vc**" formula

$$Vc = 40\ (0.26763) - \left[\frac{45}{e^{0.03\ *\left(120/365\right)}}\right]$$

$$=10.7052 \quad -\left[\frac{45}{1.0099}\right]0.2266$$

= 10.7052 –(44.5589) 0.2266

= $10.7052 – $10.097

= $0.6082

Value of the call option = ~ $0.61

AN ARGUMENT AGAINST THE BITCOIN STOCK TO FLOW MODEL

The Bitcoin Stock to Flow model is a model that predicts the value of bitcoin using a the stock to flow ratio. This theory was propounded by a twitter user — @PlanB, in his article titled *'Modeling Bitcoin value with scarcity'* as published on his Medium account. PlanB ran a linear regression by using the natural logarithm of bitcoin's Stock to flow metric as the independent variable and the USD market capitalization as the dependent variable.

The stock to flow model measures the abundance of a particular resources and it is generally calculated by dividing the amount of resources available in stock by the amount produced annually. So, in theory, all assets with higher Stock to flow ratio have higher values over the years.

The summary of his theory is that applying the stock to flow model to bitcoin and controlling bitcoin's scarcity will cause the market capitalization of Bitcoin to hit $1trillion after the next halving in May 2020, making the price of a bitcoin $55,000. In another words, he proposed that controlling the availability of bitcoin will inflate it's market price and value.

It is important to note that to evaluate the authenticity of any theory, we need to examine its assumptions closely and thoroughly. Even though PlanB's theory might look too convincing using variables that is somewhat fit for predicting the scarcity of Bitcoin i.e stock to flow metrics, If we continue to run this analysis further, the value of a bitcoin will worth over a billion dollars by 2045. One reason of this flaw is because bitcoin is just a few years old in history (10 years) when compared with other assets PlanB placed alongside bitcoin (gold and silver). As such, there are no enough data points to use in achieving a realistic forecast when compared to gold and silver.

However, there is a greater tendency of heteroskedasticity in his analysis, failing to realise alot of factors are needed to be considered when it comes to applying the stock to flow model to a digital currency. Bitcoin is highly volatile owing to many factors. People will fairly trust physical assets to digital assets, as such, any little news or information will cause panic and fear in the cryptocurrency market. It is unfortunate some of this factors cannot be quantified perfectly enough to run such analysis.

In a nutshell, the Bitcoin stock to flow model is just a manipulation of statistics to drive up the bitcoin market.

Reference

Nico, C. (2020, 30th June) Why the Stock-to-Flow Bitcoin Valuation Model Is Wrong. Coindesk. https://www.coindesk.com/why-the-stock-to-flow-bitcoin-valuation-model-is-wrong