August 7, 2020
FISCO Ltd. (JASDAQ: 3807)

# Price Formation Theory for DeFi-Related Crypto Assets Based on the Dividend Discount Model

Contents

1. Improvement in Value through “Fund Inflow Effects” and “Network Effects”
    a. Emergence of price measurement drivers through the creation of business using DApps
    b. Fund inflow effects
    c. Network effects

2. Uses of the Dividend Discount Model Made Possible by the Generation of Interest
    a. What is the dividend discount model?
    b. Case 1: the value of crypto assets generating interest does not change
    c. Case 2: the value of crypto assets generating interest improves
    d. Case 3: the discount rate decreases

3. Price Estimate for COMP
    a. Assumptions for predictions
    b. Price estimate through “fund inflow effects + dividend discount model”
    c. Price estimate through “network effects + dividend discount model”

4. Other Considerations
    a. Theory of interest parity
    b. Commissions

5. Disclaimers

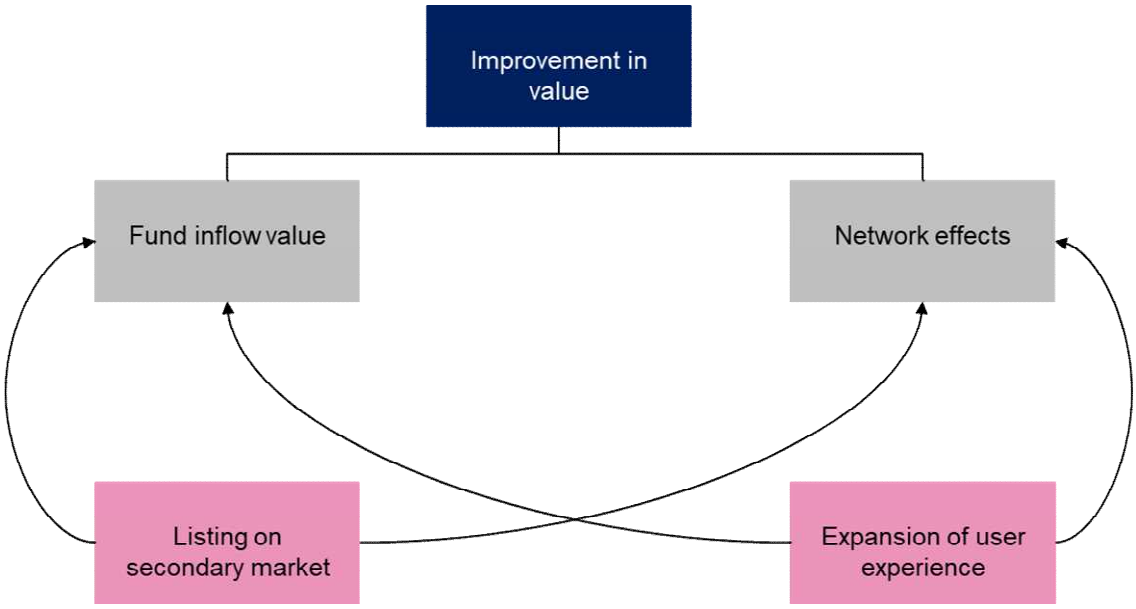
1. Improvement in Value through “Fund Inflow Effects” and “Network Effects”

a. Emergence of price measurement drivers through the creation of business using DApps

Generally speaking, asset prices set in the market and their value are not always in agreement. The stock market offers a good example. The stocks of Japanese automakers are found to have a high correlation with foreign exchange rates in the short term. However, in the long term, these stocks are highly correlated with automobile production volume, which is considered to be a fundamental driver of automakers’ corporate value. This indicates that while the “price” of Japanese automakers is strongly affected by foreign exchange rates, there is a possibility that their fundamental value is governed by “automobile production volume.” In the crypto asset market too, it is important to understand that “price and value can differ,” and to see the market from this perspective.

Conventional securities investment theories, such as the dividend discount model and discount cash flow model, are inadequate for the valuation of crypto asset investments, which do not generate dividends or interest. While we will not go into the details here, efforts continue to be made to develop investment valuation methodologies for crypto assets centered on Bitcoin. Methodologies have been proposed that examine the value of crypto assets from the following perspectives: (1) store of value; (2) token velocity; (3) Metcalfe ratio; (4) network value-to-transactions (NVT) ratio; (5) number of active addresses; and (6) crypto networks as small emerging countries. Meanwhile, price forecasts are generally made through approaches that focus on technical perspectives centered on chart analysis and methodologies focused on examining correlation coefficients between crypto assets and various economic and financial metrics.

There are some crypto assets that have the following features: “the assets are already listed on a trading market” and “the user experience of asset holders (i.e., what users can do) will expand.” Crypto assets with the former feature are rare in Japan. On the other hand, given that it is difficult to identify the value drivers of a crypto asset based solely on the fact that it is listed, investors inevitably have had to rely more on price analysis than on valuation analysis. However, if the creation of business using decentralized applications (DApps) can be expected to increase the holding volume, i.e., increase the fund inflow value, of a crypto asset used by DApps, then the “fund inflow effects” and “network effects” can be considered to be the value drivers of the crypto asset for valuation purposes. When considering the price outlook for a crypto asset, it is crucial to consider not only price analysis, but also the perspective of valuation analysis.




b. Fund inflow effects

As an example of "fund inflow effects," we can study the process of the run-up in stock prices to their all-time high on the Tokyo Stock Exchange. The market capitalization of the First Section of the Tokyo Stock Exchange surged from ¥190 trillion in 1985 to ¥611 trillion at the end of 1989. The table below shows estimates of the amount of fund inflows into the market during this time.

The estimation method is as follows:

●Calculate net inflows from spot trading in each investment sector

●Calculate net inflows from margin trading

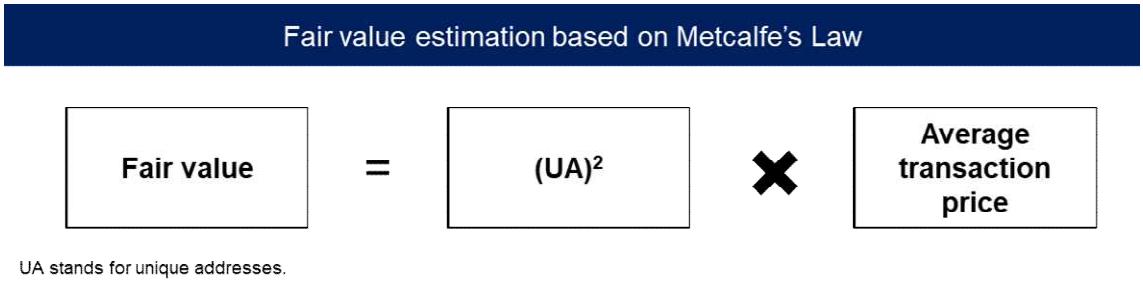
●The fund inflow value is defined as the sum of the above two amounts.

This estimate shows that the increase of approximately ¥421 trillion in the market capitalization of the First Section of the Tokyo Stock Exchange from 1985 to 1989 required a fund inflow of only around ¥20 trillion. That equates to a fund inflow of around ¥4 trillion a year. In terms of leverage, the multiple of market capitalization to fund inflow volume was 20:1.

| | Market capitalization of TSE First Section (¥ million) | Increase in market capitalization (¥ million) | Net spot buying + Net buying on margin trades (¥ million) | Increase in market capitalization / Net buying(multiple) |
|---|---|---|---|---|
| 1985 | 190,126,635 | - | 3,631,936 | - |
| 1986 | 285,471,490 | 95,344,855 | 4,101,938 | 23.2 |
| 1987 | 336,706,604 | 51,235,114 | 5,064,731 | 10.1 |
| 1988 | 476,849,798 | 140,143,194 | 6,716,183 | 20.9 |
| 1989 | 611,151,873 | 134,302,075 | 5,401,717 | 24.9 |
| Total | - | 421,025,238 | 24,916,505 | 16.9 |

c. Network effects

Meanwhile, the value of crypto assets can also be estimated based on “network effects.” This estimation method assumes that the economic value of a crypto asset will increase exponentially with an increase in the number of users. Metcalfe’s Law states that “the value of a telecommunications network is proportional to the square of the number of users on the network.” This law means that as more and more things are connected to a network like a telephone network or the Internet, the greater the value of the network will become. Take telephone networks as an example. If only two people in the world were to use a telephone network, the network would only have a one-to-one connection and its value would be limited. On the other hand, if large numbers of people use telephones worldwide, it becomes possible to calculate the value of the network as “the number of users x the number of users,” (i.e., every user benefits from having access to every other user on the network) and the value of the network increases sharply. In the case of Bitcoin, there is a very high correlation, in practice, between the number of unique addresses and the Bitcoin price.



2. Uses of the Dividend Discount Model Made Possible by the Generation of Interest

a. What is the dividend discount model?

DApps can be used to create businesses. If these businesses generate interest for investors, the dividend discount model can be used to estimate a price for crypto assets.

The present value of a stock can be calculated using the dividend discount model under certain assumptions. The formula is: Dividend (D) ÷ (Discount rate (r) – Dividend growth rate (g)). If we assume that the "D" in the formula represents the total amount of interest generated by DApps, the total amount of D will increase with an increase in the number of businesses and the size of businesses. In other words, it will act to push the price higher.

The "r" part of the formula is impacted by the weighted average cost of capital (WACC). The formula for WACC is "[Cost of shareholders' equity x shareholders' equity ÷ (interest-bearing debt + shareholders' equity)] + [Cost of debt x (1 – effective tax rate) x interest-bearing debt ÷ (interest-bearing debt + shareholders' equity)]." WACC is also a function of the cost of debt. As the quality of the businesses created by DApps based on a cryptocurrency increases, the cost of debt will be reduced as the interest rate for raising funds decreases. This will have the effect of pushing up the price.

The formula for the cost of shareholders' equity is "Risk-free rate (R(f)) + Beta (β) x Market risk premium (R(p))". The price volatility β has an impact on the cost of shareholders' equity. By making it possible to estimate the price of a crypto asset, excessive volatility can be suppressed. If the price stabilizes, this will also have the effect of pushing up the price.

$$\text{Theoretical price [P]} = \frac{\text{Dividend [D]}}{(\text{Expected rate of return [r]} - \text{Dividend growth rate [g]}}$$

$$\text{WACC} = \frac{D}{D+E} \times (1-T) \times rd + \frac{E}{D+E} \times re$$

D: Market value of interest-bearing debt

E: Market value of shareholders' equity

T: Effective tax rate

rd: Cost of debt (interest rate)

Re: Cost of shareholders' equity = rf + β x market risk premium

b. Case 1: the value of crypto assets generating interest does not change

For example, assuming that a crypto asset used in DApps offers an interest yield of 3% to investors, and the crypto asset is ¥100, the yen-denominated interest would be ¥3. If we assume that the price of the crypto asset will not change in the future, we can discount the future interest at a discount rate of 10% (set on the basis of a small- and medium-cap stock) to arrive at a present value of ¥30 (assuming an interest growth rate of zero for simplicity; same here and below). Under the assumption that the "future value of the crypto asset will not change," it would be difficult to derive a price for the crypto asset that is attractive to investors from the dividend discount model, due partly to the high discount rate.

c. Case 2: the value of crypto assets generating interest improves

Meanwhile, if we take into account the aforementioned fund inflow effects and network effects, we can expect the value of the crypto asset to increase.

We apply "the value anticipated from fund inflow effects" and "the value anticipated from network effects" to the interest earned from the crypto asset, and discount the interest by a discount rate of 10%. When we do so, we find that the result is much different. If the price of the crypto asset doubles due to an improvement in "the value anticipated from fund inflow effects" and "the value anticipated from network effects," even if the interest paid to investors with the crypto asset is 3%, the yen-denominated interest yield will be 6%. If the crypto asset is ¥100, the yen-denominated interest will be ¥6. If we discount the future interest at a discount rate of 10% (set on the basis of a small- and medium-cap stock) the present value will be ¥60.

d. Case 3: the discount rate decreases

By making a price valuation possible, price stability will increase and the discount rate will decrease. A yen-denominated interest of ¥6 and a discount rate of 5% means that the present value will be ¥120.

For the crypto asset to be used in DApps, its price must be stable. If an arrangement is in place where an agent holding a large amount of the crypto asset conducts buying and selling operations like a central bank based on a prescribed rule, it could have the effect of similarly reducing the discount rate.

3. Price Estimate for COMP

a. Assumptions for predictions

In this section, we would like to estimate the price of Compound based on the price formation theory discussed above. Compound is a DeFi protocol on the Ethereum platform. It is one of the DeFi lending services that has attracted the greatest number of users. As of August 5, 2020, the value of assets (USD) locked in this network amounted to approximately US$820 million. In the DeFi space, Compound is the second largest service following MakerDAO (source: DefiPulse). On June 15, COMP, a governance token, was distributed to users free of charge and the token was circulated in the market for the first time. Lenders deposit crypto assets in the network as collateral, and in return receive tokenized (securitized) Compound tokens (cTokens), including interest. These cTokens are compliant with the ERC20 standard for tokens, and can be transferred freely within the network on the Ethereum platform.

Basic information

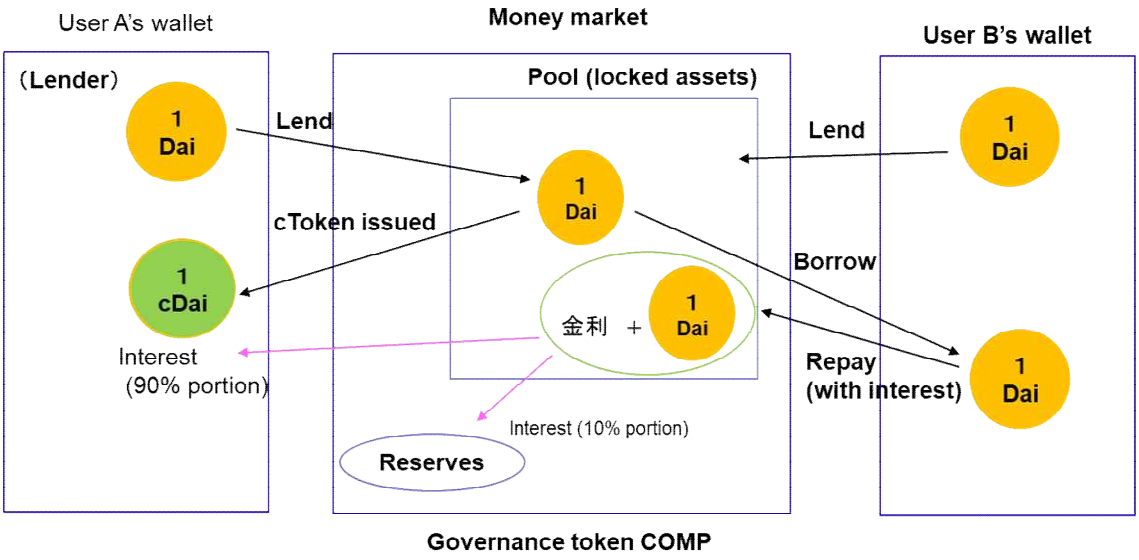
(*Figures are from Etherscan, Coinmarketcap and other sources. Data obtained on July 15, 2020)

| Type of project | Platform | Governance token | Token price (USD) | Token market capitalization (USD) | total value locked in (USD) | Issuance limit (number of tokens) | Number of addresses |
|---|---|---|---|---|---|---|---|
| Lending | Ethereum | COMP | 165.5 | 423,826,384 | 703,700,000 | 10,000,000 | 14,464 |

| | |
|---|---|
| Listed exchanges | AEX Balancer Bamboo Relay Bibox BigONE BiKi Bilaxy Binance BitBNS Bithumb Global BitMart Bittrex BitZ BKEX Coinbase Pro CoinEx Coinone CoinTiger dex.blue Digifinex DragonEx FTX Gate.io HitBTC Hoo.com Hotbit Idex KuCoin Kyber Network MXC OKEx Poloniex Probit STEX Tokenomy Uniswap (v1) Uniswap (v2) |
| Currthncies handled | DAI、USDC、ETH、ZRX、USDT、REP、BAT、WBTC、SAI |

| | |
|---|---|
| Features and strengths | The Compound protocol enables users to easily conduct lending by converting supported crypto assets to Compound's own token called cToken. It eliminates the need to first convert ETH to Wrapped Ether (WETH), which is compatible with ERC20 tokens, before lending.<br>A portion of COMP was distributed to platform users, instead of conducting an ICO. By converting COMP into a token such as cDAI, the token can be moved freely within the ETH ecosystem.<br>COMP holders have voting rights on matters such as decision-making on the Compound protocol. |
| Interest | 10% is paid into a reserve, 90% is paid out to suppliers (lenders) |
| Establishment of token | Adjustment of market circulation: Over the next four years, 4.20 million COMP tokens, representing 42% of COMP reserves, are scheduled to be distributed free of charge to users. (0.5 COMP will be allotted for every 1 block of Ethereum (approx. 15 seconds) according to market interest rates). All other COMP are held by venture capital firms and the development team. |

Compound is a money market protocol under the Ethereum algorithm, which allows users to earn interest on collateral and borrow assets. Anybody can supply assets to the Compound liquidity pool and immediately start earning continuous compound interest. The interest rate is automatically adjusted by the program based on supply and demand. The balance of supplied assets are recorded as cTokens. The cTokens represent the underlying assets that function as collateral and earn interest. The value of cTokens increases in proportion to interest rates. Users are able to borrow up to 50-75% of the value of their cTokens, according to the quality of the underlying asset. Users can deposit additional funds or withdraw funds at any time, but if borrowings run short of collateral, any network participant, not just the borrower, can liquidate the collateral. Liquidators have the ability to purchase the collateral at a 5% discount, which provides an incentive for liquidators. The Compound protocol retains 10% of the interest as a reserve. The remaining interest is paid out to suppliers.
* All of the tokens loaned by users are pooled into a smart contract, and borrowers borrow tokens from the pool. (There is no need for borrowers to wait for a counterparty.)



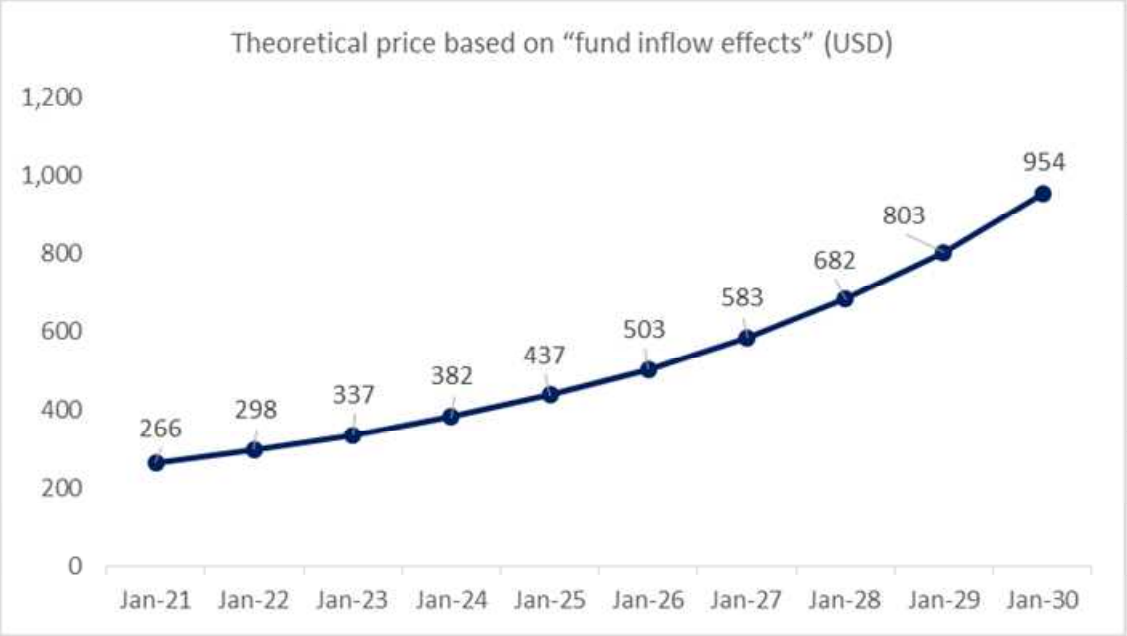

In estimating the price, we view trading transactions on exchanges and lending services as the two main fund inflow pathways for COMP. We have made certain assumptions regarding (1) the status of COMP trading on exchanges (standalone, excluding the impact of lending services) and (2) the status of use of lending services. The assumptions are listed in the diagram below.

| | Assumptions for predictions |
|---|---|
| | Status of COMP trading on exchanges (standalone, excluding the impact of lending services) |
| 10% | ・Assume the number of users will increase by 10% every month (10% per year from 2022) |
| 776 | ・The initial value for the number of users is set at 776 (the actual value as of the end of July) |
| 10 | ・Assume the number of coins loaned per user will be 10 coins on average. |
| 70% | ・Assume a PF inflow rate of 70% (the remainder is inflow from exchanges through conversions) |
| | Status of use of lending services |
| 3% | ・Assume that the number of users will increase by 3% every month until the end of 2021, starting from 20,373 in the first month (cumulative basis). |
| 0 | ・Assume users will increase by 5% every year from 2022 |
| 10 | ・Assume the number of coins for Dapps use per user will be 10 coins |
| 4.78% | ・Assume a COMP-denominated dividend yield for users of 4.78% |
| 10% | ・The discount rate will be 10% |

b. Price estimate through "fund inflow effects + dividend discount model"

The value of COMP can be estimated from "fund inflow effects" as follows. The current market capitalization of COMP is around US$350 million (US$135 per coin). If, for example, there is a fund inflow of about US$1 million per month, the market capitalization can be projected to increase by around US$20 million per year, with the "fund inflow value" acting as a major driver of the change in value. From the perspective of "fund inflow effects," the value of COMP is estimated as US$266

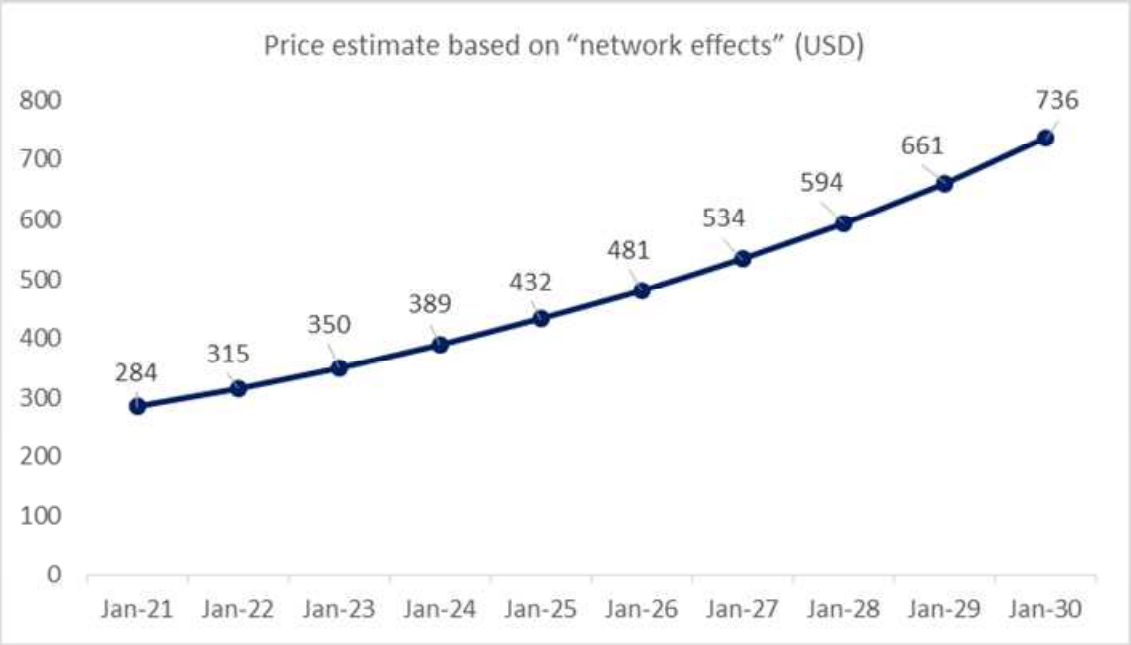
at the end of 2021, US$298 at the end of 2022, $337 at the end of 2023, $382 at the end of 2024, and $437 at the end of 2025. Looking at the price estimate based on “fund inflow effects + dividend discount model,” the present value, which is the price estimate discounted at a rate of 10%, is US$196.




c. Price estimate through “network effects + dividend discount model”

The value of COMP can be estimated from “network effects” as follows. If, for example, the number of users increases by 20% per month, the economic value of COMP can be projected to increase by 44%. Based on an outlook for the number of users over the next year to increase at a rate of 6% per month and then gradually reduce to a rate of increase of 3%, the economic value will double in one year, with “the number of users” acting as the main driver of the change in value. From the perspective of “network effects,” the value of COMP is estimated as US$284 at the end of 2021, US$315 at the end of 2022, US$350 at the end of 2023, US$389 at the end of 2024, and US$432 at the end of 2025. Looking at the price estimate based on “network effects + the dividend discount model,” the present value, which is the price estimate discounted at a rate of 10%, is US$165.

It should be noted that the aforementioned values can vary significantly depending on the underlying assumptions.




4. Other Considerations

a. Theory of interest parity

As the business ecosystem for the crypto assets used by DApps expands, market capitalization will increase and the presence of crypto assets as one type of financial asset will grow. When this happens, users will likely be able to refer to other pricing theories as well. If users can refer to more theoretical values, this will help to further stabilize the price of crypto assets.

The theory of interest parity is a pricing theory for the foreign exchange market. This theory holds that when multiple assets have different interest rates, arbitrage trading will occur. The foreign exchange market will see fund outflows and inflows that act to equalize the interest rates of the assets (so that the expected rates of return adjust to the same level), thereby putting pressure on prices. The dividend discount model is an estimate that derives the level of absolute value for assets, whereas the theory of interest parity seeks to determine the relative value between assets.

Business creation using DApps and the accompanying interest payments will allow appropriate comparisons to be made, in the case of Japan, with commercial lending rates, market interest rates, and structured financial instruments in Japanese yen. This will likely enable the markets to derive appropriate interest rates and proper crypto asset price ranges linked to those interest rates over time. In the future, when the market for these crypto assets develops and interest rate futures emerge, the movement of funds between the spot market and the futures market will be activated, along with

active arbitrage trading, and convergence to appropriate interest rates will happen at an early stage.

b. Commissions

Responsibility for trading commissions is likely to vary according to each DApp. For simplification, trading commissions have not been considered in this report.

5. Disclaimers

This report is for informational purposes only, and provides neither legal interpretation nor any solicitation to invest or take other actions.

This report includes forward-looking statements such as forecasts, outlooks, targets and plans. Such statements are based on general information as well as plans and predictions that were available at the time of writing. FISCO provides no guarantee as to the veracity, completeness, accuracy or reliability of the contents of the report or the information contained therein.

The statements, assumptions, and suppositions contained in this report are subjective, and as such may prove to be inaccurate in the future, or may not provide an accurate representation of what may be realized in the future.

The value of any marketable securities, currencies, commodities, securities and other financial instruments, or crypto assets, issued by the issuer(s) mentioned in this report can go up or down depending on corporate activities, economic policies and global circumstances, and financial losses can be incurred as a result. This report provides no guarantees of future outcomes. Readers of this report must exercise their own judgment and responsibility if utilizing this report or the information contained therein for any purpose, and FISCO will not accept liability for any loss related to said utilization incurred by readers of this report, irrespective of cause.

Any information in this report about companies other than FISCO is sourced publicly, and no guarantee is made by FISCO as to the accuracy or appropriateness of said information. Please also note that FISCO accepts no liability for any losses incurred from the utilization of this report due to any omissions or errors in the data or expressions contained therein.