

# Flow Integrated Money Market Working Paper

Antonia Chen

2 October 2019

## 1 Before Trading

To start trading, traders and liquidity providers make deposits in USD stablecoins, and iUSD tokens of equivalent value will be issued and deposited into the liquidity pools by the Flow protocols.

After receiving  $w$  USD stablecoins at time  $t$ , Flow protocols invest a proportion  $d_t w$  of the deposit into a chosen cryptocurrency lending platforms (e.g. Compound) to generate additional return from the external money market, while holding the rest  $(1 - d_t)w$  as cash reserve for liquidity, where

$$d \in (0, 100\%) \quad \forall t$$

This is because not all investment made into the cryptocurrency lending platforms can be cashed out immediately at all time, depending on the Total Supply ( $TS$ ) and Total Borrow ( $TB$ ) on the platforms prior to the deposit  $d_t w$  that

$$\epsilon_t = \frac{(TS_t + d_t w) - TB_t}{TS_t + d_t w}$$

Thus, for every 1 USD stablecoin deposit received, Flow protocol makes sure  $s$  unit of the USD stablecoins can be withdrawn at all time with full liquidity, i.e. maintaining a minimum liquidity level  $s \in (0, 100\%)$  of for all deposits we receive from liquidity providers and traders, that

$$s = \epsilon_t d_t + (1 - d_t) \quad \forall t$$

that

$$d_t = \frac{(1 - s)TS_t}{TB_t - (1 - s)w}$$

for all

$$w \leq \frac{TB_t - (1-s)TS_t}{1-s}$$

Once there are more than one deposit invested into the lending platforms, re-balance (with adjustment  $k_t$  if needed) is performed at each time when a new deposit (or withdrawal, i.e.  $w < 0$ ) is made, to make sure the minimum liquidity level is maintained.

For

$$W = \sum_{i=1}^n w^j \quad \text{and} \quad D_0^j = d_0^j w^j$$

where  $D_t^j$  grow in USD stablecoins as receiving returns from lending platforms.

Solve

$$\epsilon_t^n \sum_{i=1}^{n-1} (D_t^j + k_t^j) + \sum_{i=1}^{n-1} [(1-d^j)w^j - k^j] + \epsilon_t^n D^n + (1-d_t^n)w^n + k_t^n = sW$$

$$\epsilon_t^n = \frac{(TS_t + d_t^n w^n + k_t^n) - TB_t}{TS_t + d_t^n w^n + k_t^n}$$

for  $k_t^n$ , where  $k^1 = 0$  and any  $k_t^j > 0$  also grow in USD stablecoins as receiving returns from lending platforms.

- If  $k_t^n = 0$ , no additional action will be performed.
- If  $k_t^n > 0$ , an additional deposit of  $k_t^{n+1}$  will be invested into the lending platform.
- If  $k_t^n < 0$ , a withdrawal of  $|k_t^n|$  will be taken out of the lending platform.

## 2 Return of fEUR

If a trader wants to purchase fEUR tokens, he needs to deposit the required amount of USD stablecoins firstly. After iUSD tokens of equivalent value are issued and deposited into the liquidity pool by the protocols, fEUR tokens will be minted according to the exchange rate and transferred to the trader.

Now the trader may use the fEUR tokens to his will, that he can either keep them in his wallet, spend them as a medium of payment, sell them in external exchanges, or he can choose to deposit the fEUR tokens back to the protocol to earn return.